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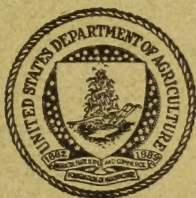
ISSUED OCTOBER 1938

BIBLIOGRAPHY ON SOIL EROSION
AND
SOIL AND WATER CONSERVATION

Compiled by
STANLEY H. GAINES
Soil Conservation Service

With Abstracts

By
FRANCESCA VINCENT, MARION BLOOM
and **JAMES F. CARTER**



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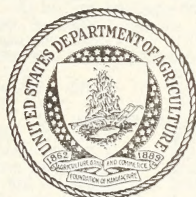
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UNITED STATES
GOVERNMENT PRINTING OFFICE
WASHINGTON: 1938

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INTRODUCTION

This bibliography is a list of references to published material on soil erosion and soil and water conservation. Some of these references may not appear to deal directly with erosion or conservation, but they all have a pertinent relationship to some phase of the subject. With respect to material of questionable merit, the compiler was guided by the opinions of a committee composed of Mildred Benton, M. H. Cohee, S. D. Frissell, H. E. Middleton, and E. H. Reed.

The scope of this bibliography is indicated both by reference to the table of contents and list of citations by geographic regions. References to writings on erosion in foreign countries have been included only when they contained real historic interest or had a significant bearing on erosion conditions in the United States. The reader is referred to a Selected Bibliography on Erosion and Silt Movement, United States Geological Survey Water Supply Paper No. 797, for references to literature on erosion in foreign languages.

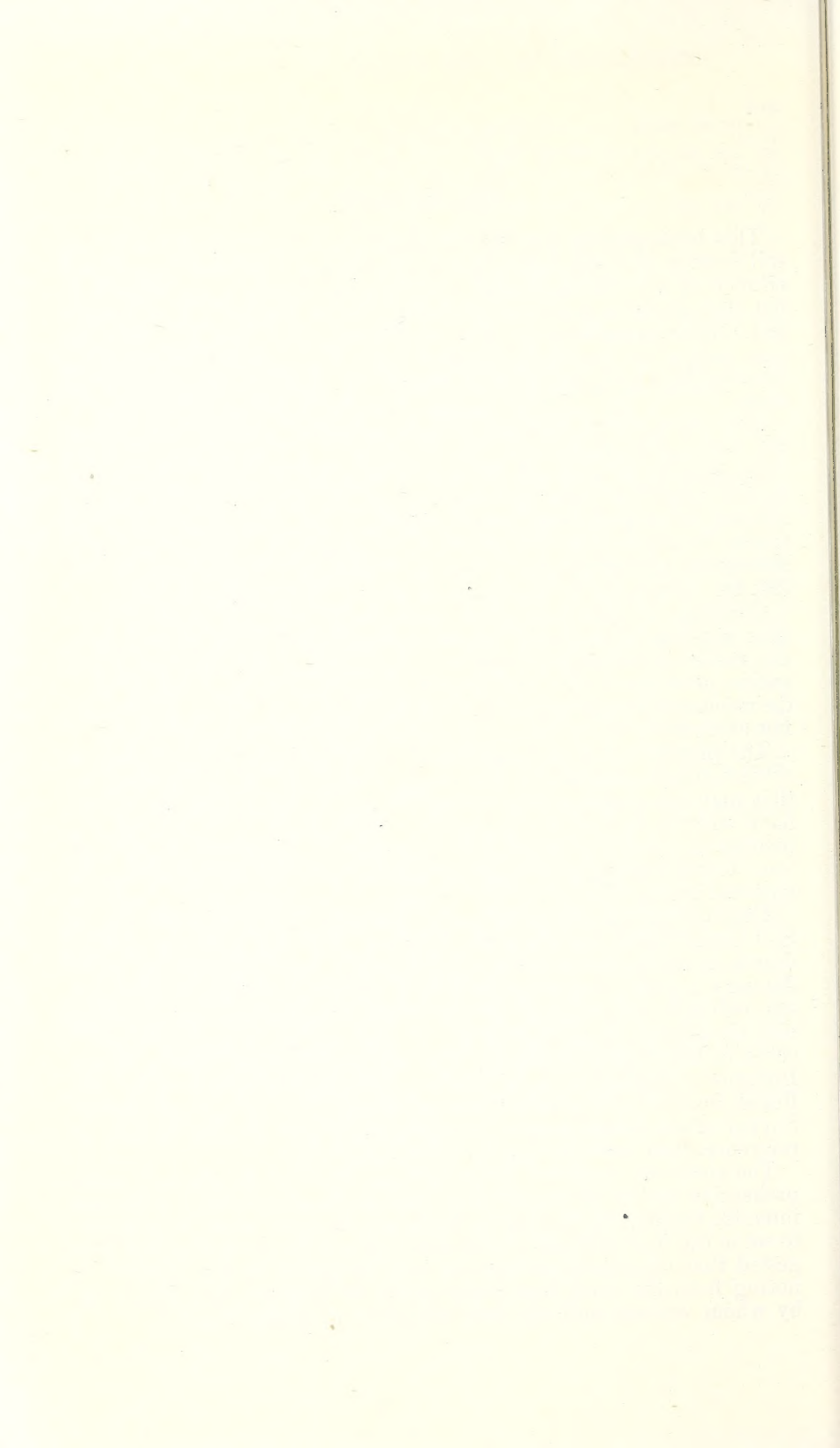
Citations are included which refer to literature on farming practices and conditions from colonial times to the present. Owing to the vastly increased need, however, that interest be taken in conservation problems during the past 25 or 30 years, a large majority of the references are to material published during this period. With very few exceptions, no citations date later than August 1937.

The purpose of the bibliography is primarily to provide authors, subject-matter specialists, and students with a medium by which they may determine, with a minimum of time and effort, what others have written on a given related subject, whether it be scientific or historic in nature or merely indicative of the trend of public opinion. Consistent therewith, references to both popular and scientific material are included.

This bibliography has two major sources. (1) A Bibliography on Soil Conservation by Lillian H. Wieland, 1935, revised by June Henderson in 1936 (mimeographed); and (2) references dating from January 1, 1936, from the library of this Service, which had been selected and abstracted by or under the direction of Mildred Benton, librarian. A systematic search was made for pertinent references in bibliographies issuing from other bureaus, particularly the Bureaus of Agricultural Economics, Agricultural Engineering, and Forest Service of the Department of Agriculture, and the Geological Survey of the Department of the Interior. With few exceptions, all references have been verified and abstracts written.

The abstracts contained herein are not, for obvious reasons, a comprehensive review of the article or publication abstracted. They are intended to amplify ambiguous titles and in many cases, it is hoped, to serve the final purpose of the user of the bibliography. It is suggested that the reader temper his own judgment in this respect by noting from the entry how many pages of material are referred to, by whom written, and the time and place of publication.

▼



BIBLIOGRAPHY ON SOIL EROSION AND SOIL AND WATER CONSER- VATION

Compiled by STANLEY H. GAINES, *Soil Conservation Service*, with abstracts by
FRANCESCA VINCENT, MARION BLOOM, and JAMES F. CARTER

EROSION AND CONSERVATION IN GENERAL

ANONYMOUS.

(1)

CHECKING TENANCY HELPS SAVE SOIL. *Wallaces' Farmer* 62: 405. May 22, 1937.

States that our real erosion problem "is to get more farmers to stay put, to get more long-term tenants and permanently established owner-operators . . . With 33 percent of our farmers moving every two years, what chance is there to check destruction of the soil? Can we ever check erosion until we check the growth of tenancy?"

(2)

COL. LOWDEN ON SOIL CONSERVATION. (Editorial.) *Agr. Engin.* 17: 43-44. February 1936.

From an interview with Frank O. Lowden: "When the soil from which the greatness of the city springs is once impoverished, or the people in it are reduced to penury, the city will vanish. History records a long line of great metropolitan centers that disappeared because they neglected the countryside which nourished them."

(3)

CONFERENCE SEEKS FLOOD CONTROL ACTION. FORESTERS AND ENGINEERS STRESS COMPREHENSIVE PLANS FOR MAJOR WATERSHEDS AT 62D ANNUAL MEETING OF THE AMERICAN FORESTRY ASSOCIATION. *Amer. Forests* 43: 344-346, 354, 363-365, illus. July 1937.

Brief excerpts from addresses, proceedings, and resolutions passed at meeting held in Cincinnati, Ohio, May 31, 1937. Resolutions were adopted concerning flood control and soil and water conservation.

(4)

CONSERVATION GONE WILD. *Amer. Cattle Prod.* 17: 15. April 1936.

An editorial objecting to the soil conservation program to reclaim plains and prairie grasslands.

(5)

CONSERVATION OF THE SOIL. *Amer. Forests* 41: 526-529, illus. September 1935.

"The alarming feature of 'man-made' erosion is the swiftness with which it spreads to take an ever increasing toll of land resources . . . This accelerated erosion is divided into three categories: sheet erosion, gully, and wind erosion." Demonstration projects in California, West Virginia, and Missouri for soil erosion control are described and illustrated. "Slowly but surely the day of soil exploitation is passing and in its stead is arising a genuine interest in soil conservation."

(6)

CONSERVATION'S CHALLENGE TO THE PRESIDENT. (Editorial.) *Amer. Forests* 42: 555. December 1936.

(7)

DAWN OF CONSERVATION. *Amer. Forests* 41: 446-449, illus. September 1935.

The writer traces the theory of nature's inexhaustibility to the early Americans whose dominant concern was the conversion of natural wealth into goods

and money for maintenance of life, and home and community development. It is pointed out, however, that colonial America did have a conservation creed of a kind represented by regulations and ordinances designed to protect resources against waste and theft, measures which were prompted by depletion of local timber supplies. Brief sketches of pioneers and their work in forest conservation are presented.

ANONYMOUS.

DELIVER US FROM SURPLUS AND SHORTAGE. Wallaces' Farmer 62: 525, illus. July 17, 1937. (8)

Recommends reducing the acreage of corn, wheat, cotton, and similar crops, and putting these acres into grass and legumes which will survive droughts. States that more than 75 percent of the country consists of sloping land, "all of which invites erosion and floods when used for row crops or when grazed down to the grass roots."

DUST AND POLITICS. Business Week, pp. 15-16. April 20, 1935. (9)

"Control of soil erosion has forced its way to the front as a major issue that is loaded with dynamite because preventive measures applied now will have no discernible effect for several years to come."

EROSION CONTROL IMPERATIVE. Farm Mach. and Equip. 1795: 14. July 15, 1933. (10)

At a Farm-and-Home-Week meeting at Madison, Wis., H. H. Bennett stated that the United States is depleting its agricultural lands faster than any other nation. Erosion and its prevention and control are discussed.

EROSION CUTS ACRE YIELDS. Sci. Amer. 148: 122. February 1933. (11)

The United States Department of Agriculture is quoted: "Lower crop yields per acre with resulting higher production costs are among the chief dangers of land erosion." An account is given of how erosion is being checked in many parts of the United States through terracing, sodding, and similar practices, proving that excessive erosion can be controlled.

EROSION OF SOILS. Science 69: [Sup. xlviii.] February 1, 1929. (12)

The writer quotes the appeal of H. H. Bennett before the House Appropriations Committee for increased funds for soil erosion work. Erosion in various sections of the country is described at some length, and methods of cropping, terracing, etc., are discussed.

FARM LAND GOING TO SEA. (Editorial.) Lit. Digest 73: 23-24, illus. August 26, 1922. (13)

The writer states that 135 carloads daily is the rate at which the Savannah River alone is carrying the soil of Georgia into the ocean. "There appear to be only three practical methods open to man to retard the waste of the soil, namely, terracing, deep plowing, and the protection of the forests." The life history of a gully in the uplands of the coastal plains is presented.

FARMERS ORGANIZE TO FIGHT THE EROSION MENACE. WISCONSIN AND MINNESOTA SOIL CONSERVATION ASSOCIATIONS PROVE THEIR WORK AND POINT THE WAY TO FUTURE WORK. Save Our Soil 1: 1, 4, illus. May 1936. (14)

Emphasizes the fact that the future of soil erosion control rests upon the farmers and soil conservation associations. "More and more the function of the Federal government in this work is to be that of an advisory and administrative agency."

FARMS THAT VANISH. Wallaces' Farmer 58: 3, 9. illus. January 21, 1933. (15)

The problem of annual plant-food loss from fields and pastures in the United States is discussed. The rolling lands of southern Iowa are cited, and the results of varied experimental work in erosion control to determine how best to care for soils are described. Practical systems for gully control are illustrated.

ANONYMOUS.

(16)

THE FIGHT AGAINST SOIL EROSION. Farming in So. Africa 5: 253, 260, illus. September 1930.

The report of the drought investigation commission on the best means of avoiding losses by drought is cited as "likely to appear in history as a beacon, marking a definite period in the country's awakening to the far-reaching danger of soil erosion . . . The various causes of soil erosion, its present dimensions, and the national disaster to which it is leading, are clearly and unequivocally stated therein. And, above all, there are given remedies which the Commission recommends for checking and ultimately overcoming the evil." Reference is also made to the soil erosion conference at Pretoria in November 1929, and especially, with regard to its decision that the minister of agriculture should be responsible for the policy governing soil erosion, with a strong advisory council composed of state, provincial, and municipal representatives and also of direct farmer representatives from the South African Agricultural Union.

(17)

500 IN BUDAPEST ARE GREETED BY HORTHY. REGENT OPENS SESSIONS AT WHICH SILCOX REPLIES FOR THE UNITED STATES AND SIR ROY ROBINSON FOR GREAT BRITAIN. Forestry News Digest, pp. 1-2. November 1936.

Summary of proceedings of the second International Forestry Congress, held at Budapest, Hungary, in September 1936. Flood control and soil protection were among the topics discussed. The Regent remarked to F. A. Silcox, of the United States Forest Service: "You have a big job ahead of you. Yours is a country of dust storms. Here in Hungary we have not much erosion but we are planting thousands of locust trees on the plains."

(18)

FLOOD CONTROL FEATURED BY CONFERENCE. THE AMERICAN AND PENNSYLVANIA FORESTRY ASSOCIATIONS JOIN IN SIGNIFICANT MEETING. Amer. Forests 42: 459-462. October 1936.

Summarizes proceedings of the meeting held September 9-11 in Eagles Mere, Pa. "The need of a more intensive educational program in all phases of conservation was recognized by the conference, and a program enlisting the active interest of states, counties, communities and individuals was urged." The C. C. C. program was endorsed, the program of the United States Forest Service was criticized by speakers, and the necessity for research in the field of wildlife restoration and protection was stressed.

(19)

HAMILTON, DESERT MAKER. (Editorial.) Nation 143: 229. August 29, 1936.

Exception is taken to Hamilton's speech at Albuquerque, N. Mex., at which he said: "The new Triple-A, through its soil conservation provisions and its efforts to put eroding slopes to grass, 'is paying every farmer of this nation to go into competition with the cattle and sheep men of the great grazing states of the West'."

(20)

IMPORTANCE OF WATER CONSERVATION. Reclam. Era 26: 201-202. September 1936.

Quotes an address given on August 5, 1889, by John Wesley Powell, Director of the Geological Survey, before the North Dakota Constitutional Convention, and urges the preservation and storage of stream water in North Dakota.

(21)

INSURING AGAINST DROUGHT AND FLOOD. Wallaces' Farmer 60: 3. June 22, 1935.

Effects of drought and flood in China and Palestine are sketched briefly, and warning is given that American soil fertility must be preserved. "We have seen that rolling lands, kept too long in crops and washed by repeated rains, has provided only thin crops . . ." The writer believes that the problem is solvable by making it possible for farmers to handle their land as they know it should be handled—get more land down to grass and avoid cropping land subject to severe erosion. "We are making a start on this

by buying up marginal land for forest and pasture, for making erosion control possible for many farmers, and by providing, through the A. A. A. an incentive for farmers to get more land back into grass."

ANONYMOUS.

(22)

LEARNING TO FARM WITH GRASS. Wallaces' Farmer 60: 4-9, illus. July 20, 1935.

Gives results of interviews with farmers after a trip through southern Iowa and northern Missouri concerning erosion control and lands returned to grass. "By 1980, at the present rate of erosion, there will remain in the two States 19,000,000 acres that are tillable, as against 69,000,000 acres at the present time. Terracing is an important part of erosion control, but is far from the cure-all for erosion that many have assumed." The consensus of opinion was that it is better to shift to a greatly reduced grain crop acreage and make farming and livestock economy almost entirely dependent upon grass and legumes.

(23)

LIVESTOCK AND SOIL CONSERVATION. (Editorial.) Farm and Ranch 55: 8. August 1, 1936.

Discusses the need for soil-conserving crops in southwestern farming regions in conjunction with livestock farming.

(24)

NEW FARM-AID SLOGAN. SOIL CONSERVATION EMPHASIZED OVER CROP-CONTROL METHOD. (Editorial.) Lit. Digest 121: 4-5, illus. January 25, 1936.

"'Crop-control' fades from the New Deal lexicon and 'soil conservation' emerges." Herbert Hoover is quoted as finding the problem still unsolved by New Deal collectivism and offers a policy of his own. Various newspapers are quoted.

(25)

ORCHARD SOIL EROSION. Hoosier Hort. 16: 8. 1934.

An article by Dr. Lee, of the New Jersey Agricultural Experiment Station, is quoted as to the value of cover crops in orchards. He stresses the loss of soil in the orchard sections of New Jersey and advocates proper terracing, permanent sod, strip cropping, and dams across gullies as effective control measures.

(26)

OUR WATER-RETAINING AND OUR WATER-EVAPORATING AREAS. Forest Leaves 6: 138-142. April 1898.

The writer points out that "just now our areas of water-evaporation in this State [Pennsylvania] are increasing and our areas of water-retention are decreasing." Three dangers menacing the State as a result of increasing drought are: (1) Interference with agriculture; (2) limited water-power for manufacturers, and (3) increase in the virulence of disease germs. In conclusion it is stated: "For all of this impoverished land there is but one hope. It must be restored to a forest condition, or become progressively worse and harder to reclaim."

(27)

PINCHOT OPPOSES DEPARTMENT OF CONSERVATION. Amer. Forests 43: 196-197. April 1937.

(28)

PRESIDENT LEADS GREAT CONSERVATION RALLY. Amer. Forests 41: 588-590, illus. October 1935.

"A permanent Civilian Conservation Corps, through which 300,000 American youths will pass each year, the development of a plan of sustained yield management on private forest lands, and the creation of an extensive forest credit system for timberland owners" were envisioned as the goal in the Nation's conservation program by the President in his address to the American Forestry Association at Lake Placid, N. Y., on September 14, 1935.

ANONYMOUS.

(29)

PRESIDENT ROOSEVELT'S RADIO ADDRESS AT END OF DUST BOWL TOUR. *Com. and Financ. Chron.* 153: 1648-1649. September 12, 1936.

The President saw drought devastation in nine States and was deeply impressed with the general efficiency of those agencies of the Federal, State, and local governments which moved in on the immediate task created by the drought. The work provided for farm families is to be paid by the Federal Government, but each State is to take care of its unemployables. Water conservation is being expanded all through the Great Plains area, the western Corn Belt, and in the States that lie farther south. In the Middle West the work projects run more to soil erosion control and the building of farm-to-market roads. This is "spending to save." As the program gets into operation the people will be able better to maintain themselves securely on the land. "Sound policy must maintain farm practices in good crop years as well as in bad crop years. It must function when we have drought; it must also function when we have bumper crops."

(30)

THE PROBLEM OF SOIL CONSERVATION ON LANDS ADJACENT TO MAIN ROADS. *Rhodesia Agr. Jour.* 34: 142-145, illus. February 1937.

(31)

PROBLEMS OF WATER. *Amer. Forests* 41: 520-525, illus. September 1935.

"Problems of water use and control are intimately interwoven with the use and abuse of land." The need for vegetative cover and reforestation for lessening the quantity and velocity of water moving over the surface of slopes is stressed. The storage of water for drinking purposes, water and agriculture, and the public aspects of water conservation are discussed. The author urges national planning for water conservation and control of rivers and streams. Investigation has emphasized "the vital necessity of coordinating plans of water conservation and control with those of forestry, soil erosion, and land use generally."

(32)

PROGRESS IN SOIL EROSION CONTROL. *Farming in So. Africa* 10: 400. October 1935.

"The schemes inaugurated by the Department of Agriculture and Forestry for combating the soil erosion menace in the Union [South Africa] have received a great measure of support from landowners." Tables show the extent of erosion in certain districts.

(33)

PUBLICITY RUN WILD. (Editorial.) *Engin. News-Rec.* 116: 713. May 14, 1936.

Criticizes the claim of Soil Conservation Service writers that "erosion control operations have greatly reduced floods on a number of typical head-water streams in our demonstration watersheds." The writer mentions early American floods and continues: "To assert that restoration of the forests and of sod-cover, strip-cropping, or gully-control check-dams, will cope with the flood problem is deception and demagoguery."

(34)

THE REPUBLICAN FARM PLANK. *Ind. Farmer's Guide* 92: 19. June 20, 1936.

Advocates an agricultural policy for the protection and restoration of the land resources, "designed to bring about such a balance between soil-building and soil-depleting crops as will permanently insure productivity, with reasonable benefits to cooperating farmers on family-type farms . . ."

(35)

RESULTS OF FOREST DENUDATION IN MOUNTAINOUS REGIONS. *Forest Leaves* 11: 122-123. April 1908.

Changes resulting from denudation in Dalmatia, on the Adriatic Sea, are pointed out. "That country was once one of the richest Roman provinces, and during the reign of Diocletian . . . supported a large population. When it came under the rule of the Venetian Republic the trees on its fine mountain slopes were ruthlessly sacrificed for the building of ships of the conquerors . . . when the timber was cut off the declivity was so great that

the soil was washed away, the springs and rivers dried up, so that even the desolation of Syria does not compare with that in Dalmatia." From careful observation in European and Asiatic countries the author concludes that if the primeval forests could have remained, such erosion would have been prevented. "There is yet time in America to prevent such barrenness and the drying up of streams."

ANONYMOUS.

(36)

RESULTS OF SAND AND RAVINE BINDING WORK IN RUSSIA. *Ezheg. Lies. Dept.* 1: 423-494. 1909.

"An account is given of sand and ravine binding work conducted in the Voronezh, Kharkov, Poltava, Saratov, and Samara provinces of Russia . . ."—*Expt. Sta. Rec.* 27: 148. 1912.

(37)

RIVER AND REGION. *Engin. News-Rec.* 117: 897-901, illus. December 24, 1936.

"Development of the Tennessee River for navigation, water conservation, flood control, and power involves many regional problems, including cover cropping and forestation to check erosional silting, and development of recreational and mineral resources."

(38)

ROOSEVELT RECOMMENDS A DEPARTMENT OF CONSERVATION. *Amer. Forests* 43: 74, 92. February 1937.

(39)

SAVE OUR SOIL. *Collier's* 97: 86. March 14, 1936.

An editorial presenting a general discussion of the demolition of fertile lands in the United States. "Happily there is no political controversy over the broad principle of reclaiming land now in jeopardy."

(40)

SAVE THE SOIL. ANCIENT TRUTHS ARE REDISCOVERED. *Rev. of Reviews* 93 (4): 28-30. April 1936.

The writer discusses rural land conditions and the new farm bill passed by Congress in February 1936, from the economic, soil-improvement compensation, and the farm-census standpoints. Attention is called to the rapid restoration of shell-torn land in France and Belgium within 6 years.

(41)

SHEET EROSION GREATEST SOIL DESTROYER. *Farm and Ranch* 50: 13. June 20, 1931.

Reviews an address by H. H. Bennett at the annual meeting of the American Forestry Association at Asheville, N. C. "Mr. Bennett outlined some of the work being done by the Department of Agriculture in the study of erosion and methods of preventing it."

(42)

THE SOIL AND CIVILIZATION. *Nature Mag.* 26: 43-45, illus. July 1935.

Discusses some national aspects of the soil-erosion problem. Figures on annual losses incurred by wastage are given, with an estimate of the amount of soil washed into the Gulf of Mexico. Dust storms and grazing are cited as two important factors.

(43)

SOIL CONSERVATION. (Editorial.) *Madras Agr. Jour.* 24: 313-315. September 1936.

Recommends concentrated attention on the problem of soil conservation in Madras and cites progress made so far. "This problem of soil conservation will also be a fit subject for the joint action of the Engineering and Agricultural departments to start experiments for the determination of cheap and efficient methods of control suited to the various tracts . . ."

(44)

SOIL CONSERVATION. *Fert. Rev.* 11: 4-5. January, February, March 1936.

Editorial comment on a half century of experiments in soil conservation against plant-food losses. Acceleration of the program since 1933 is

pointed out, and the increased benefits for farmers under the 1936 Soil Conservation and Domestic Allotment Act are discussed.

ANONYMOUS.

(45)

THE SOIL CONSERVATION SERVICE. Science 85: 69. January 15, 1937.

A summary of the annual report for the fiscal year 1936.

(46)

"SOIL DEFENSE". (Editorial.) Farm Jour. 61: 4. March 1937.

"'Conservation' is too much like 'conversation'— and a good deal of it means the same thing. But 'Soil Defense'—that is exactly what we mean, and it describes exactly what has to be done if farming is to continue in this country." The writer mentions Farmers' Bulletin 1767, dealing with washed-away soils of the Piedmont region, and says "this Bulletin does what should have been done long ago."

(47)

SOIL EROSION. Science 69: 446-447. April 26, 1929.

This article sums up the report of H. H. Bennett to the Department of Agriculture on soil conditions. More than 513,000,000 tons of soil are being washed out to sea each year from the farms of the United States, and the Mississippi River system alone is responsible for 428,000,000 tons. The need for terracing, contour plowing, and wise forestry management, with scrupulous attention to small gullies is stressed.

(48)

SOIL EROSION. (Editorial.) Trop. Agr. [Ceylon] 61: 321-322. December 1923.

The problems of soil erosion in Ceylon and India discussed in the papers collected and published in the Tropical Agriculturist for September awakened considerable interest among agriculturists, and "much good work in terracing, the digging of contour drains and silt pits, and in planting of hedges of leguminous plants has been undertaken." The problem of lands that are the property of the State requires very close investigation as to forest cover on watersheds, reforestation, and other questions. "Ceylon will have to draw upon the experience of its oldest agriculturists, and endeavour to frame a policy which will tend to the preservation of its great assets—its soil."

(49)

SOIL EROSION. Farming in So. Africa 4: 559. February 1930.

The resolutions, adopted by the Soil Erosion Conference at Pretoria, South Africa, in 1929, include encouraging farmers to build small dams as one of the best methods of controlling soil erosion.

(50)

SOIL EROSION. (Editorial.) Trop. Agr. [Ceylon] 64: 1-3. January 1925.

"The removal of the surface soil either by 'dry wash', or by action of the rains, deprives the land of its richest and most fertile part, and if not arrested, will ultimately render its cultivation unremunerative . . . It cannot be too strongly insisted upon, that, as far as regards the maintenance of the soil of estates, the dominant factor in the promotion of soil erosion is the run-off from cultivated land, that is, the point at which the soil erosion question has to be attacked, and the responsibility for that rests with the estates themselves." Two lines of action are presented: Contour belts of cover plants and "the protection of the sides of the main drains which run down the slope. In many instances, these are now deep ravines owing to the constant erosion of their banks. This formation of ravines can be prevented by growing grass along the sides in the case of permanent streams, or over the whole drain, if it is usually dry. Here again, a creeping grass, such as *Paspalum conjugatum*, is required, rather than one which grows in tussocks."

(51)

SOIL EROSION A SERIOUS PROBLEM. Bur. Farmer [Ky. ed.] 4: 17. April 1929.

The author discusses tonnage of soil carried out to sea. "This continuous and heavy loss of the soil on which the very food supply of the nation

depends is interpreted by H. H. Bennett as "the most important problem that has to do with the use of our most vital resource—the land." Terracing, contour plowing and cultivation, wise forest management, with scrupulous attention to gullies, are recommended.

ANONYMOUS.

SOIL EROSION AND NATURAL COVER. *Empire Forestry Jour.* [London] 11: 76-77. July 1932. (52)

In discussing soil erosion the writer quotes experiments and findings of Bennett and Lowdermilk. "The danger arises from the removal of the layer of top-soil, rich in phosphorus, and almost irreplaceable, caused by the careless breaking-up of the natural vegetable cover by agriculturists."

SOIL EROSION CONTROL. *Science* 81: 332-333. April 5, 1935. (53)

An account of the transfer of the Soil Erosion Service from the Department of the Interior to the Department of Agriculture and a résumé of the Soil Erosion Service program for 1935.

A SOIL EROSION EXPERT. (Editorial.) *Trop. Agr.* [Ceylon] 88: 69-70. February 1937. (54)

"At a meeting of the Central Board of Agriculture held in September, 1936, the following resolution was unanimously passed: 'That this Board recommends to Government the appointment of a whole-time officer to undertake soil erosion investigations and to organize propaganda on this subject.' This resolution was unanimously endorsed by the general committee of the Ceylon Planters' Association . . . Soil erosion work may be classed under four heads: (1) Collection of data relating to soil erosion in Ceylon; (2) Experimental work; (3) Study of anti-erosion methods and the publication of authoritative information on such methods; (4) Advisory and propaganda work . . ." The soil erosion committee of 1931 made the suggestion that an extra staff officer for soil erosion be appointed "whose duty it will be to organize the courses recommended and assist the Director of Agriculture and revenue officers and others who may require help."

SOIL EROSION IN BASUTOLAND. *Scot. Geogr. Mag.* 51: 308-309. September 1935. (55)

The report on the financial and economic position of Basutoland [Africa] draws attention to the serious problem of soil erosion, which threatens the development of this territory. "Soil erosion and water conservation may be said to be the two problems of general interest in South Africa . . . Measures to check this damage, must, in the opinion of the Commission go much farther than mere reparation." The use of contour ridges and control of grazing are two of the remedies proposed for the control of soil erosion.

SOIL EROSION IN INDIA. (Editorial.) *Trop. Agr.* [Ceylon] 61: 140-143. September 1923. (56)

The report of a committee appointed in 1916 to deal with the subject of soil erosion is reconsidered. In it data were given as to soil denudation, surface drainage, and the conservation of moisture. The conclusions and recommendations of this committee are summarized, and a resolution dealing with soil erosion that was passed by the board of agriculture is given.

SOIL ROBBING. (Editorial.) *Hoard's Dairyman* 81: 350. July 10, 1936. (57)

A discussion of soil erosion. The writer states that "this new awakening in land erosion and land conservation is a wholesome sign that we still have a greater interest in our country than simply utilizing its resources for immediate gains."

"TREES IS TREES." (Editorial.) *Amer. Forests* 43: 293. June 1937. (58)

The author discusses the arguments advanced by Secretary Ickes defending his scheme to transform the Interior Department into a Department of Conservation and thereby bringing under his dominion all the plant and animal resources of the public lands. The statement is made "that forestry

has nothing to do with agriculture. This argument, of course, is meant to remove one of the fundamental objections to his plan; namely, it would rend asunder the unity of the government's farm-forest land program. The mere suggestion that the growing of trees for harvesting is a crop activity that falls within the field of agricultural land management appears to arouse the satirical ire of the Secretary."

ANONYMOUS.

(59)

VANISHING FARMLANDS. *Ag-Ex News* 3: 2-3, illus. January 1934.

Erosion surveys and financial losses from erosion are discussed. "The use of high explosives for erosion control . . . has proved highly practical, economical and speedy . . ."

(60)

WASHING AWAY OF SOIL COSTS MILLIONS ANNUALLY. *Bur. Farmer* (Tenn. ed.) 5: 9. November 1929.

Destruction by sheet washing is emphasized. Terracing and cover crops are recommended as remedial measures.

(61)

WATER CONSERVATION. *Trop. Agr. [Trinidad]* 11: 249-251. October 1934.

The writer contends that the individual small agriculturist should learn to combat drought and conserve moisture by studying primitive methods of water lifting and transport still in use in China and Egypt. Soil surveys which would link rainfall data to the water requirements of the plant are an essential preliminary to the formulation of water-conservation schemes. Windbreaks and research in drought-resistant plants and trees are discussed.

ADAMS, B.

(62)

TEMPERING CONSERVATION WITH COMMON SENSE. *Cornell Countryman* 33: 39-40. December 1935.

"When conservationists claim too much they weaken their case." The writer points out the harm that can be done to the cause of conservation by exaggeration.

ADAMS, CHARLES FRANCIS.

(63)

IN DEFENSE OF RESERVATION POLICY. *Forester* 4: 97. 1898.

In a communication to Senators and Representatives the writer says: "I understand that it is proposed to open certain forest reservations in several of the Mountain States, and restore the land included in them to the public domain. I refer to the Senate amendment to pending Sundry Civil Appropriation bill." After describing the deplorable results of forest destruction in various European countries, especially Spain and Italy, he continues: "The deforesting which has taken place throughout our mountain region, unless a remedy is speedily applied, is destined to produce results of a most disastrous character . . . a bounty should in my judgment be placed upon the cultivation of trees, especially over what are known as 'the plains', while the Government could make no better use of alternate sections than planting them with trees natural to the region. So doing would in the course of twenty years put an end to the hot winds and diminish the droughts."

ADAMSON, R. S.

(64)

SOME ASPECTS OF SOIL EROSION. *Jour. Bot. Soc. [South Africa]* 19: 13-16. 1933.

The author treats very briefly some of the special aspects of erosion present in the southwestern cape region. He describes the characteristics of climate and rainfall as well as vegetation of this area and concludes: "As the whole country is dependent on the mountains for its water supply it would seem obvious that a preservation of the vegetation on them is both urgent and essential."

AGRICULTURAL OFFICERS IN INDIA.

(65)

PAPERS ON SOIL DENUDATION. *Indian Tea Assoc.* 43, 95 pp., illus. 1917.

In an introductory article, G. D. Hope, scientific officer, states that "this collection of papers expresses the views of experts in Indian Agriculture on the subject of wash and its prevention, on surface drainage, and on the conservation of soil moisture, all of which are important considerations . . .

closely bound up with the still more important subject of soil aeration and the control of rainwater and of soil moisture generally. These are also all matters on which it is impossible to lay down more than a few rules of general applicability for guidance in dealing in practice with the problem of soil erosion." Hope goes on to discuss rainfall, and methods of cultivation and drainage with regard to terraces of varied form. In a note by Keatinge on soil denudation in the Bombay Daccan, the use of stones for building bunds (field embankments) is described. He classifies bunds according to their three uses: (1) For terracing streams so as to break the force of the water; (2) for holding of water for wet crops; and (3) for preventing wash on sloping land. The wide field of soil erosion is covered. Diagrammed plans on slope drainage and other erosion-control practices are included.

ALLISON, R. V.

(66)

SOME REMARKS ON THE SCOPE AND CHARACTER OF RESEARCH IN SOIL AND WATER CONSERVATION. *Amer. Soil Survey Assoc. Bull.* 17: 150-154. State Col., Pa. 1936.

Outlines research activities of the Soil Conservation Service under the following headings: The Problem; Tentative Divisions of the Work; Climatic and Physiographic Studies; Soil and Water Conservation Investigations; Watershed and Hydrologic Studies; Sedimentation and Hydraulic Studies; Economics of Soil Erosion Control.

(67)

AMERICAN SOCIETY OF CIVIL ENGINEERS, COMMITTEE ON CONSERVATION OF WATER. CONFERENCE ON WATER CONSERVATION. REPORT ON PROGRESS . . . CONFERENCE . . . LOS ANGELES, CALIF., MAR 3-14, 1935. 102 pp. [Los Angeles] 1935.

A report of the committee on conservation of water, irrigation division, American Society of Civil Engineers. Partial contents: Resolutions Adopted by Conference on Water Conservation, p. 2; Economic Limits of Conservation of Flood Water by Spreading, by K. Q. Volk, pp. 42-44; Run-off From Small Experimental Plots, by F. B. Laverty, pp. 45-63; Measurement of Debris Transported From Burned Areas, by C. W. Sopp, pp. 63-73; The Physical Crisis of Land Use, by W. C. Lowdermilk, pp. 73-77; Safeguards on Denuded Watersheds, by W. V. Mendenhall, pp. 82-87; Run-off and Erosion Experiments in Mountain Areas, by C. J. Kraebel, pp. 87-95; Erosion and Run-Off Experiments from Cultivated Areas, by L. A. Jones, pp. 95-101.

ANSTEAD, R. D.

(68)

CONSIDERATION OF THE EROSION PROBLEM IN CEYLON. *Trop. Agr. [Ceylon]* 61: 155-161. September 1923.

The writer contends that soil erosion is brought about by three main causes: Destruction of vegetation, burning of grass, and overgrazing, and that the Government should do everything to encourage and assist all owners of land to tackle their individual problems in the proper manner. Deforestation and its consequences are fully discussed, and tables are given for comparison in rainfall and run-off in well-forested and nonforested areas. The prevention of soil erosion by means of terracing, contour drains, silt pits, contour stone walls, contour hedges of leguminous or other plants, use of leguminous cover crops for decreasing the velocity of surface run-off, is described. "From the State's point of view the following have to be kept in view: (1) the necessity of retaining forests on steep slopes; (2) the compulsory reforestation of eroded areas; (3) the control of rivers and streams; (4) stipulations in leases of all lands given out for cultivation as to drainage and control of surface wash. In France, the ownership of all rivers and streams is vested by special law with the Government and in Italy the State has always exercised this ownership as well as ownership over all springs."

ARIZONA UNIVERSITY.

(69)

ARIZONA AND ITS HERITAGE. *Ariz. Univ. Bull.* v. 7, No. 3 (Gen. Bull. 3), 291 pp., illus. [1936.]

"This bulletin is not meant in any way to be a manual of the State, but merely to present briefly, but by no means adequately, some of the facts of interest not only to visitors but even to residents." A collection of articles relating to Arizona among which are: Conservation, by H. L.

Shantz, pages 7-10; Climate, by H. V. Smith, pages 26-31; Soils, by W. T. McGeorge, pages 31-37; Forests, by C. K. Cooperrider, pages 53-60; Indian Agriculture, by H. L. Shantz, pages 199-205; and Pioneer Agriculture, by R. H. Forbes, pages 205-210.

- AYLEN, D., AND ROBERTS, R. H. (70)
SOIL CONSERVATION. Rhodesia Agr. Jour. 24: 90-120, 173-222. February and March 1927.

Brings up to date and replaces the earlier Rhodesia Department of Agriculture Bulletin 923, Soil Erosion. These articles deal with such erosion problems in Rhodesia as progress towards control, veld and gully erosion, protective works, contour ridges, and various methods of strip cropping. "Soil conservation is a wide term, and is not confined entirely to 'contour ridging,' but includes any and all measures aimed at protecting the soil. In its essentials it is a matter of wise use of land and good farming practice."

- AYRES, Q. C. (71)
SOIL EROSION AND ITS CONTROL. New York and London, McGraw-Hill Book Co., Inc., 365 pp. illus. 1936.

This work brings together in one volume data on the nature of erosion, causes of exhaustive erosion, and the various ways in which excessive rates may be controlled. Over half of the book is devoted to detailed directions on strip farming, tree planting and care, and on the design and construction of terraces, ditches, and dams. "This book is offered to meet the need for a general treatise on erosion control for the use of students in colleges and vocational agriculture departments, county agents, engineers, farmers, public officials, bankers, investors, and others who may be interested in the subject." A bibliography is appended, pages 341-352.

- BAILEY, G. E. (72)
VERTICAL FARMING. 69 pp., illus. Agr. Div. E. I. du pont de Nemours Powder Co., Wilmington, Del. 1915.

Contents: The Origin and Character of Soils; Fertilizers and Chemical Properties of Soil; Soil Moisture: Its Control and Conservation; Soil Bacteria; Movement of Moisture and Feeding Zone of Roots; Cultivation—Use of Explosives. For controlling soil erosion by retention of rainfall the author says: "The surface may be sealed over by a little crust or there may be plow sole, tight clay, or hardpan deeper down which limits the soil's absorption to the immediate surface."

- BAKER, O. E. (73)
LOOKING AHEAD IN AMERICAN AGRICULTURE. Amer. Fert. 86: 10-11, 24-26. January 1937.

The writer discusses some consequences of concentration of agricultural production, and of a less commercial agriculture. Visits to a number of German farms 2 years ago are described. "The German farmer is keeping faith with the past and with the future. He is conserving both the natural and the human resources." In conclusion the writer affirms his belief "that better land utilization and a better living in American agriculture depend in large measure upon achieving a continuity of family proprietorship in farming."

- BARROWS, H. K. (74)
INVENTORY OF WATER RESOURCES OF THE NORTH ATLANTIC DRAINAGE AREA. 62 pp. 1935. [Multigraphed.] National Resources Board, Washington, D. C.

An abstract of a report to the water resources section, embracing the States of Maine, Massachusetts, Rhode Island, Connecticut, New Jersey, Delaware, and portions of Vermont, New York, and Pennsylvania.

- BARROWS, LELAND. (75)
—AND SO WE GROW. The Land, Today and Tomorrow 2 (2): 9-12, illus. February 1935.

Describes the inception of eight soil erosion projects in various parts of the country. A map defining Location of Soil Erosion Control Projects is included.

BATES, C. G.

(76)

THE EROSION PROBLEM. Jour. Forestry 22: 498-505. May 1924.

The author discusses soil erosion from the geological and philosophical aspect. "In considering the erosion problem, either at its source or its destination, the fact should be clearly borne in mind that the silt load carried by water gives to floods their most sinister aspect. It is my purpose to convince you, if possible, that the heart and kernel of the stream-flow problem is in erosion, rather than in volume of water, and that if we cannot prevent erosion on the National Forests, we are doing little to justify our stewardship."

(77)

SOIL EROSION IN THE MISSISSIPPI VALLEY. Jour. Forestry 31: 88-96. January 1933.

Although this article discusses erosion mainly from an agricultural point of view, it covers the fundamentals of erosional processes and the resultant loss of surface soil to cataclysmic proportions. The national character of the problem and the close connection between farm-soil conservation and river control are particularly stressed, calling for an attack by engineers, foresters, and farmers under united leadership.

BAVER, L. D.

(78)

SOIL EROSION IN MISSOURI. Mo. Agr. Expt. Sta. Bull. 349, 66 pp., illus. 1935.

This bulletin was prepared to acquaint the people not only with the severity of erosion but also with the methods by which the farmer and the public can work out an effective erosion-control program. Erosion in the different soil areas is discussed separately "If soil washing continues at the present rate and if the Missouri farmers and the general public do not concentrate their efforts to control it, at the end of the next 50-year period there will probably be about 22,000,000 acres of excessively eroded land that have lost over three-fourths of the original surface soil, 10,000,000 acres that have lost between one-half and three-fourths of the original soil, and about 4,000,000 acres of upland soil that will be slightly to moderately washed away."

BAYER, A. W.

(79)

THE RELATIONSHIP OF VEGETATION TO SOIL EROSION IN THE NATAL THORNVELD. So. African Jour. Sci. 30: 280-287. October 1933.

"It is generally agreed that the immediate cause of most soil erosion in South Africa is the removal of the vegetation covering of the soil, and that any agent which serves to destroy vegetation is a potential cause of erosion . . . Whilst this general relationship of soil erosion to vegetation has been much discussed and generally accepted, observations made in the thornveld areas (and these are the areas most subject to erosion) in Natal, suggest that this relationship has not yet been studied sufficiently intensively. Facts have come to light which indicate that a great deal of further study is required with regard to the methods to be adopted, and the type of vegetation to be encouraged, in order to minimize the rate and extent of soil erosion in these areas." Plant succession, variations in the succession, plant competition in the drier areas, effect on soil erosion, suggested methods of combating erosion in the thornveld, are considered by the author, a botanist, who states in conclusion: "Whatever opinion may be expressed with regard to these suggestions, it is clear from this study of the relationship of vegetation to soil erosion, that any attempt to combat soil erosion in either the thornveld or the grassveld by the adoption of a policy of afforestation, unless this is done under carefully controlled conditions, is likely to end in failure."

BEAR, F. E.

(80)

HOLDING BACK ACCUMULATED FERTILITY. Ohio Farmer 146: 362. September 25, 1920.

The writer describes the loss of topsoil and fertility owing to bad management of streams and land on the old home farm in Montgomery County near Dayton, Ohio. He contends that vigilance is a necessity and discusses the construction and use of brush and concrete breakers and dams.

BECKLEY, V. A.

(81)

SOIL EROSION. Kenya Colony Dept. Agr. Bull. 1, 78 pp., illus. 1935.

Contents: The Position in East Africa Today; The Factors Affecting Erosion; Types and Effects of Erosion; Soil Conservation and Anti-Erosion Measures; The Application of Soil Conservation Measures in Particular. "A survey of erosion in British East Africa shows that in many parts conditions are rapidly approaching those that led the Union Drought Commission to their conclusion that, unless methods were radically altered, desert was in sight." Check, straw, stake, wire, brush, stone, and earth dams are used for reclaiming gullies.

BEELER, M. N.

(82)

FARMS AFIRE! Capper's Farmer 45: 6-7, illus. September 1934.

Continuous plowing and tillage are farm practices that unduly speed destruction of soil fertility and increase losses from wind and water erosion. "It is excessive working and continuous cropping which does not give the land a chance to recuperate that leads to ruined soil." The experiences and opinions as to tillage and crop cultivation of several farmers in Pettis and Boone Counties, Mo., Cass County, N. Dak., and in Iowa, Indiana, Illinois, and Arkansas are discussed.

BENEDICT, M. R.

(83)

AN APPRAISAL OF ASPECTS OF THE TRANSITION PROGRAM FOR AGRICULTURE. Jour. Farm Econ. 19: 28-47. February 1937.

This paper discusses the programs of the Resettlement Administration and the Soil Conservation Service. W. C. Lowdermilk discusses the relation of the Service to the individual farmer, pp. 40-45; J. A. Hopkins discusses some further aspects of the Service, pp. 45-47.

BENNETT, H. H.

(84)

THE BLIGHT OF EROSION. Ark. Gaz. (Mag. Sunday Ed.) pp. 1, 13, illus. August 5, 1934.

Measures for combating the destruction caused by soil erosion are presented. Twenty-four major watershed erosion-control demonstrations at selected eroded regions of the country are mentioned. Reference is made to soil conservation practices now being put into force in South Africa and in Italy.

(85)

COMBATING THE MENACE OF SOIL EROSION. Lit. Digest 117: 18, 38, illus. April 14, 1934.

With 35,000,000 acres essentially destroyed, and wreckage of farmland still proceeding at an appalling rate, the Government attacks the problem with a coordinated program of erosion control. Strip cropping, terracing, and rotation crops, are among the measures employed at the demonstration areas that have been set up. "It has been very encouraging that in most of these areas approximately 90 percent of the farmers are entering enthusiastically into the program, offering every reasonable measure of cooperation."

(86)

CONSERVATION ON THE WATERSHED BASIS. Agr. Leaders' Digest 18: 8-9, illus. January 1937.

"The Up-stream Engineering Conference in Washington, D. C., September 22-23 [1936], constituted a comprehensive forum on the land-planning, engineering, and agricultural aspects of flood reduction and erosion control." The acting chief of the Forest Service suggested a three-point program for watershed demonstration projects of the Soil Conservation Service. The writer maintains: "This exchange of information and viewpoints has laid a groundwork . . . for greater unity of action in dealing with the fundamental problems of both water and soil conservation. The engineer, the economist and the agriculturalist understand one another better, and appreciate the importance of working on a watershed basis rather than on isolated small areas."

BENNETT, H. H.

(87)

COST OF SOIL EROSION. Ga. Inst. Pub. Affairs, Ann. sess. Proc. 8 (Ga. Univ. Bull. 34 (11)): 184-201. 1934.

The yearly cost of soil erosion to farmers and ranchers is estimated at "not less than \$400,000,000, along with numerous other formidable losses, such as damage to highways and railways, the silting of reservoirs, stream channels and ditches with the products of erosion, and damage to valley lands by overwash of sand, gravel, and poor subsoil material washed out of the uplands." Better land use as contrasted to our habits of waste is discussed together with examples of erosion and demonstrations in erosion control. Strip cropping is urged for saving the soils. A brief sketch of the national soil conservation program is given.

(88)

COST OF SOIL EROSION. Ohio Jour. Sci. 33: 271-279. July 1933.

"Unrestrained soil erosion is rapidly building a new empire of worn-out land in America: land stripped of its rich surface layer down to poor subsoil, and land gullied beyond the possibility of practical reclamation . . . From every conceivable angle erosion is a devastating agency. It is the greatest thief of soil fertility." The writer discusses the national program of soil and water conservation. Work being done at the Red Plains Erosion Station near Guthrie, Okla., is described, and results are given.

(89)

THE COST, HISTORY, ALARMING EXTENT AND YEARLY RAVAGES OF SOIL EROSION PRESENT A VERY TRAGIC FARM PROBLEM. Tobacco Grower 1: 2-3, 7, illus. May 1933.

Discusses soil erosion in Virginia and other Southern States. The writer attributes the trouble mainly to the lack of interest and slipshod control practices of the farmers. Sheet erosion is described as a most insidious menace. In suggesting control methods the work and findings of several agricultural experiment stations are cited.

(90)

DEMONSTRATIONS SHOW FARMERS HOW TO CONTROL EROSION. Fert. Rev. 9: 2-3, 14, illus. October 1934.

"The Old World gives us vivid examples of soil erosion. There scientists digging deep into the earth have found valuable relics, buildings, even cities, long buried. Beneath 40 feet of soil these priceless treasures of Old World civilization have been found. What covered them up? Simply the products of soil erosion . . ." To combat this menace and curb the drain of erosion on farm values, estimated at a cost of \$400,000,000 annually, the Soil Erosion Service attacks the problem with a three-way weapon—cropping, forestry, and engineering measures. The program aims to save millions of acres of land through large-scale demonstration projects.

(91)

ECONOMICS OF PREVENTING SOIL EROSION. Agr. Engin. 10: 29, illus. September 1929.

Studies in precipitation and soil loss in Texas, Missouri, North Carolina, and northeastern Kansas are described. The relation of erosion to soil type, stratigraphic soil features and erosion, and the character of soil cover are discussed in detail. "There is abundance of evidence that the estimate of 1,500,000,000 tons of soil material annually washed out of our American fields is exceedingly low. Even so, the amount of plant food contained in this is about 126,000,000,000 pounds, on the basis of the average analyses of 389 samples of surface soil collected throughout the country."

(92)

EROSION A NATIONAL PROBLEM. U. S. Soil Conserv. Serv. 23 pp. 1934. [Mimeographed.]

In this address before the Ohio Valley Improvement Association, at Cincinnati, Ohio, some national aspects of the erosion problem are discussed and Nation-wide methods of control outlined.

BENNETT, H. H.

(93)

EROSION CONTROL'S THE THING. *South. Agr.* 65: 5, 34, illus. September 1935.

The author discusses the ravages of soil erosion throughout the Nation. He outlines the program of the Soil Conservation Service and its relation to the individual needs of the farmer. The functions of the South Tiger River project at Spartanburg, S. C., are described as an example of a typical project.

(94)

FARMS ARE WASHING AWAY. *Lit. Digest* 115: 13, illus. June 24, 1933.

"Mr. Bennett, writing in the *New York Times*, tells of the 3 billion tons of soil that are washed out of fields and overgrazed pastures in America.—Editor. "Bedrock has been reached in countless places and deep gullies have torn asunder millions of sloping acres . . . Probably no other nation or race has permitted such rapid depletion of large areas of its agricultural lands." Estimates indicate that erosion steals 21 times as much plant food as the crops take from the land. Every method of soil erosion control is being experimented with, and every effective experiment will constitute a demonstration.

(95)

GEOGRAPHICAL RELATION OF SOIL EROSION TO LAND PRODUCTIVITY. *Geogr. Rev.* 18: 579-605, illus. October 1928.

"The problem of soil erosion is complex, for the process is exceedingly variable in its effectiveness from place to place, on varying soil and slope, with varying vegetative cover, type of land usage, and character of precipitation." Illustrations are given of the process at work under varying conditions, taken largely from the author's own field work. Factors affecting soil erosion; variations in clay soils; erosion of silt soils in the Mississippi-Missouri Basin, and types of erosion in the central coastal plain and drier regions, are discussed. The relation of erosion to floods is touched on, and terracing and contour cultivation to check erosion are indicated.

(96)

HALTING EROSION. *Amer. Forests* 40: 62-65, 94, illus. February 1934.

The new program for erosion control coordinates all essential factors in attacking the national enemy. Check dams, contour planting of sorghum in Texas, and erosion-resistant contours in Wisconsin are discussed. Demonstrational areas and examples of land destruction and reclamation are cited.

(97)

HIGHWAYMAN OF THE FIELD. *Farm Jour.* 58 (11): 5, 17, illus. November 1934.

Erosion steals the rich topsoil at the rate of an inch a year. Terracing and strip cropping are advocated to prevent this loss.

(98)

INCREASED COST OF EROSION. *Ann. Amer. Acad. Polit. and Social Sci.* 142: 170-176. March 1929.

"Soil erosion as an agent of land depreciation and destruction constitutes the biggest problem confronting the physical side of land utilization in this country." Attention is given to the evils of gullied lands and sheet erosion. Estimates on losses are given for the southern brown loam belt, the northern brown loam region of the Middle West, and the plains of the Southwest. Terracing is encouraged as a remedy.

(99)

LAND IMPOVERISHMENT BY SOIL EROSION. *Kans. State. Bd. Agr. Bien. Rept.* (1929-30) 27: 171-187, illus. 1930.

The author views the problem from a national standpoint and after citing many instances of erosional waste in various parts of the country recommends practical measures of control. The situation in the Southwest is given special attention.

BENNETT, H. H.

(100)

A LOOK AT SOME OF THE WESTERN PROJECTS. Soil Conserv. 1: 1-8, illus. November 1935.

The writer comments on the work being done on western soil-erosion demonstrations and tells why he feels encouraged by results already accomplished. "I saw unmistakable evidence that the hundreds of land users cooperating with the Service have come to understand the significance of cultivating and overgrazing all kinds of land, as if it all, steep and level, clay and sandy, were equally adapted to continuing productive use."

(101)

LOOKING AHEAD. The Land, Today and Tomorrow 2: 1-4. January 1935.

The need for cooperation with other State and Federal agencies as the Soil Erosion Service enters the year 1935 is stressed.

(102)

MENACE OF SOIL EROSION. Nation's Agr. 11: 4-5, 18-19. March 1936.

"Two hundred years of land abuse and exploitation have brought to the United States a physical land crisis of enormous importance. Uncontrolled soil erosion . . . is costing American farmers not less than \$400,000,000 every year in abandoned acreage and the loss of fertile soil." The author discusses the consequences of soil erosion and concludes by saying that "if only reasonable concessions are made to the demands of natural laws," the results of the Soil Conservation Service program "will be measured in terms of national welfare, including the preservation of basic soil resources, the protection of vital facilities for navigation, the reduction of floods, and the protection of reservoirs."

(103)

MUST BATTLE TO SAVE SOIL; COMMUNITY FORESTS AND GRAZING RESERVES NEEDED. Forestry News Digest, pp. 14-15. February 1935.

"No nation or race has used its agricultural lands so wastefully as the United States. Once we looked upon these lands as being limitless and inexhaustible, and while we have spent hundreds of millions of dollars for fertilizers, soil-improving crops, plant breeding, agricultural machinery, and education with the view of conserving the fertility of the land, we have done little to conserve the soil itself. We have permitted erosion to become the scourge of the land—the real crisis in land use. A properly coordinated plan such as will bring about vitally necessary correction of our mistakes calls for the retirement of certain specially vulnerable types of land from cultivation, such as the steeper, highly erosive lands of formerly timbered areas and the more sandy lands of the Great Plains and other sections where blowing rapidly strips the ground of the loose material and piles up worthless heaps of sand on good land to the leeward. Beyond this, the cultivated areas must be so handled that they will not rush off into the rivers or blow across the continent."

(104)

OUR VANISHING FARM LANDS. Com. and Finance 18: 2087, 2091. September 1929. [Also in North Amer. Rev. 228: 167-177. August 1929.]

The frequency of floods and the causes are discussed. "A contributing cause to the greater frequency of floods, and one that weighs heavily upon American agriculture, is the unrestrained erosion of the land by abrasive rainwater." The need for terracing is stressed, and reference is made to the clause in the contracts on land loans made by the Federal Land Bank at Houston, Tex., which requires the owner to protect his fields by terracing if the soil needs protection. "It is significant and highly encouraging that, with thousands of loans outstanding, the Houston bank has found it necessary thus far to foreclose on but one or two farms."

(105)

THE PROBLEM OF SOIL EROSION IN THE UNITED STATES. Ann. Assoc. Amer. Geogr. 21: 81-90, illus. September 1931.

"Within the past two years the Federal Department of Agriculture, cooperating with the States, has established seven regional experiment stations for the purpose of studying the principles underlying erosional proc-

esses and for working out practical methods of erosion control . . . At these stations every promising agronomic, forestal, and engineering method for minimizing the impoverishing toll are to be tried out on a field scale as quickly as possible." Man-induced erosion is discussed, and the writer considers the significance of the topsoil and the importance of Nature's stabilizers. Erosion in the Texas Black Belt, erosion surveys in Oklahoma, Missouri, Illinois, and other States, soil washing in the western ranges, the silting of reservoirs, are described and discussed.

BENNETT, H. H.

(106)

THE PROBLEM OF SOIL EROSION IN THE UNITED STATES. 1st Internatl. Cong. Soil Sci., Washington, D. C. Proc. and Papers Comn. 6 (4-5) : 748-757. 1927.

"Land wastage and soil impairment by erosion constitute the most important and difficult problem confronting the farmers on millions of acres of rolling lands throughout the United States . . . In many counties ugly gullies and denuded slopes have largely forced farming operations from the uplands into the stream bottoms, and millions of acres of former productive bottom lands have been ruined by overwash. This type of gradual land wastage known as sheet erosion never ceases work on sloping areas . . . Terracing of fields and the growing of trees and grasses on idle lands and areas too steep for cultivation and upon soils that are highly susceptible to washing, as a combination of practices, represents the most needed thing in the entire field of conservation." Some of the relationships existing between soil types and erosion are discussed. The author advocates systematic research work in the identification of other types of erosion and methods of control.

(107)

THE PROBLEM OF WATER AND SOIL CONSERVATION. U. S. Soil Conserv. Serv. 19 pp. 1935. [Mimeographed.]

An address given before the Iowa State College Farm and Home Week, February 8, 1935. Sketches the history of soil erosion in the United States and considers various aspects of the problem today. Individual wastefulness and lack of a cooperative policy are cited as the basic reasons for the ravages of accelerated erosion. The program and objectives of the Soil Erosion Service are given considerable attention. Recent work accomplished by the Service is mentioned.

(108)

REAL REASON FOR WORN-OUT SOIL. Farm Jour. 50: 10, 46-47, illus. April 1926.

The writer cites erosion as the real reason for worn-out soil and describes the ways in which it operates. He recommends such erosion-prevention measures as terracing and reafforestation of sloping lands.

(109)

SAVING OUR LAND HERITAGE. Wash. Univ. Forest Club Quart. 10: 16-20. Autumn 1936-37.

The writer outlines general erosion conditions in the United States and gives an account of the work of the Soil Conservation Service, its program, and objectives. He discusses particularly the work and studies carried out in the Pacific Northwest.

(110)

SOIL CONSERVATION. Rev. of Reviews. 75: 303-306, illus. March 1927.

The annual net loss of plant food taken out of the soil by the removal of crops together with wastage caused by erosion is discussed. "Some of the plant food taken out of the soil by crops may be replaced locally by nutrients moving upward from the substrata." The necessity of soil preservation is stressed, and the operations of agencies at work are cited. Reforestation for waste and idle spaces and terracing of hillsides are advocated. "Thousands of fields south of the Potomac are still in cultivation that would have been destroyed long since but for the efficiency of the terraces in holding back the soil."

BENNETT, H. H.

SOIL CONSERVATION. U. S. Soil Conserv. Serv. 21 pp. 1934. [Mimeographed.] (111)

An address before the National Editorial Association, New Orleans, La., May 4, 1935. The broader issues of the soil erosion problem in the United States are discussed and figures on annual soil losses throughout the Nation given. The causes of erosion are dealt with, and control measures are recommended.

SOIL CONSERVATION, THE KEY TO PERMANENT AGRICULTURE. Kans. State Bd. Agr. Rept. 55 (217-A) : 41-51. 1936. (112)

"Agricultural America is on the threshold of a new era. I shall undertake to tell you why this seems to be a fact; to weigh recent events and fathom their significance; to chart, if I can, the development of a new philosophy of the land, and to explain your role and mine in the transition which appears to be taking place." The activities of the Agricultural Adjustment Administration, the Civilian Conservation Corps, and the Resettlement Administration are described. "The cause of soil erosion is simple enough; the cure of erosion is as complex as human economics."

SOIL DEFENSE IN THE SOUTH. U. S. Soil Conserv. Serv. SCS-MP-8, 7 pp. 1936. [Mimeographed.] (113)

In this address, given before the North Carolina Improvement Association at High Point, N. C., data on soil losses in the South and methods of control are given.

SOIL EROSION. Prof. Engin. 15: 23-24. November 1930. (114)

The process of soil erosion and its cost to the Nation, the waste of soil caused by floods, and the urgent need for a sound policy of national economy in the form of a far-reaching, soil-saving program are presented.

SOIL EROSION—A NATIONAL MENACE. Sci. Monthly 39: 385-404, illus. November 1934. (115)

"The nation may as well realize now that it has a land crisis on its hands—the problem of man-accelerated soil erosion, and that every stroke of work performed in opposition to this evil adds value to our most basic resource—the soil. Control of erosion is urged as an unavoidable necessity and the creation of the Soil Erosion Service is described. The procedure being followed in the Coon Valley (Wis.) erosion project is described as well as other soil erosion-control projects in other parts of the country.

SOIL EROSION AND A NATIONAL PROGRAM FOR SOIL CONSERVATION. Documentary Material on the Inter-American Conference on Agriculture, Forestry, and Animal Industry, Washington, D. C., pp. 81-90. September 1930. (116)

The problem of soil erosion, examples of land wastage in various States, erosion in dry regions, the need for large and comprehensive soil and water conservation programs are discussed. The work at experiment stations established by the Government for the study of erosion and water conservation is described.

SOIL EROSION IN THE UNITED STATES. 4th Pacific Sci. Cong., Java, Proc. pp. 333-353. 1929. (117)

"As the result of erosion large areas of agricultural lands in the United States are declining in productivity and usefulness at a rate much greater than has generally been suspected . . . As I interpret the situation, after a prolonged study of the soils of the country in their varying characteristics and in their varying relationships to agriculture, it is the most important problem that has to do with the use of our most vital resource—the land . . . Erosion is a force of prodigious power." Some distressing examples in the Piedmont are described. "Land devastation by gullying is going on in many parts of the Western States, notably in the Southwest."

Sheet erosion is discussed as is also the relation of soil type to erosion, and the relation of erosion to floods. Land protection and conservation of rainfall are treated. Literature is cited.

BENNETT, H. H.

(118)

SOIL EROSION PROBLEM UNDER INVESTIGATION IN NATIONAL CONTROL PROGRAM.

U. S. Dept. Agr. Yearbook 1932: 344-351, illus. 1932.

An account of the nature of soil erosion, its different forms, and the extent of the annual damage. Plans for experimentation are described and control methods recommended. In outlining the national soil erosion program the author states: "It is proposed to carry on programs of education and extension work in order to arouse land users, the Nation, States, counties and business men to the seriousness of the problem of erosion, its meaning and cost; to point out the necessity for employing practical methods of control, emphasizing the fact that erosion is a business problem which must be solved now, and not one that can be put off for future generations to take care of."

(119)

SOIL EROSION TAKES \$200,000,000 YEARLY FROM U. S. FARMERS. U. S. Dept. Ag. Yearbook 1927: 591-593. 1928.

Discusses soil erosion and the need for research and corrective demonstration work.

(120)

SOIL—NATION'S MOST OUTSTANDING ASSET WILL CONTINUE TO RULE PROGRESS.

Tobacco Grower 1: 1-2. June 1933.

Part 1 of a series of articles on soil erosion in the South. Outlines the findings of soil erosion surveys and describes the causes of soil losses. The writer warns that despite the improvement of seed and cultural methods and the increased use of fertilizers and soil-improving crops, our crop yields are not increasing everywhere and have fallen in many localities.

(121)

THE SOIL ROBBER. Better Crops With Plant Food 9: 5-9, 60-62, illus. August 1927.

The author contends that "steep mountain slopes are ideal forest lands—to clear them for crops is nothing less than criminal trespassing upon nature." A decided change in the system of soil management is called for. Wastage in the Piedmont and other regions is described, and reforestation measures, hillside terracing, and permanent pasture lands are discussed.

(122)

STATEMENT PRESENTED . . . BEFORE SUBCOMMITTEE OF HOUSE COMMITTEE ON PUBLIC LANDS. U. S. Soil Erosion Serv., 28 pp. 1935. [Mimeographed.]

Gives a résumé of the activities of the Soil Erosion Service and an appraisal of the results of the Soil Erosion Service program. Erosion-control activities of various foreign countries are outlined, and a national program for the United States is proposed.

(123)

SUNSHINE AND SHADOW. Soil Conserv. 3: 30-33, illus. August 1937.

Encouraging and discouraging facts are given about soil and water conservation in the Pacific Northwest as observed by the writer on a trip through northwestern trans-Mississippi country.

(124)

THE THIEF OF SOIL FERTILITY. Ohio Farm Bur. News 12: 7, 19. June 1933.

"Millions of acres of farm land are being ruined by rain water running wild . . . Our best lands are largely in use and have been for some time." Statistics of soil loss are given. The writer urges the correction of unwise land-use practices.

(125)

TRAGIC TRUTH ABOUT EROSION. Forest Preserve Assoc. N. Y. State, 20 pp., illus. Schnectady, N. Y., 1934.

"In this pamphlet The Forest Preserve Association of New York State Inc., reproduces an article pertaining to soil conservation and correct use of the land published in the New York Times, June 17, 1934, by Hugh Hammond

Bennett . . . In addition some other data relating to this menacing national problem of accelerated, man-induced erosion are included . . ."—Foreword.

BENNETT, H. H.

(126)

UNCLE SAM SPENDTHRIFT—IX. NEGLECT CAUSES TWO HUNDRED MILLION DOLLARS YEARLY LOSS BY SOIL EROSION. *Sci. Amer.* 136: 237-239, illus. April 1927.

The writer describes trying experiences with erosion on his farms in the middle Piedmont as well as the means taken for their reorganization. Construction work on terraces is described and illustrated. The need for demonstration work is stressed, and other measures to prevent erosion on steep slopes suggested.

(127)

UNSEEN MENACE OF EROSION. NEW DISCOVERIES SHOW ALMOST ALL TILLED ACRES SUFFER LOSS. *Country Gent.* 93: 12-13, 150-151, illus. October 1928.

The national menace of gullied land and "the tremendous damage being done by water on practically every tilled acre in the country" are stressed. The construction and maintenance of the proper type of terrace, with special reference to the Mangum type, and the use of earthen dams to prevent soil washing are discussed.

(128)

UTILIZATION OF SMALL WATER POWERS. *Soil Conserv.* 2: 74-80. October 1936.

"Dust storms and unprecedented drought over wide areas have made the people, both those directly affected and throughout the entire nation, acutely aware of the relation of total water resources to agriculture, of types of agriculture to water supply, and of the need of dealing with the combined problem of soil and water conservation as a whole through the planned rehabilitation and control of entire river systems." Selected data on water power from various censuses of the United States are given in tabular form. This article was written for the third World Power Conference, Washington, D. C., 1936.

(129)

WASTE BY WIND AND WATER. *Sci. Monthly* 42: 172-176. February 1936.

Wind erosion, sheet erosion, and gullyng are discussed, as well as the philosophy underlying the objective of soil conservation. The objective in substance is "merely to readjust agricultural practice to needs of the soil," and its realization is far off, the writer contends.

(130)

WASTING HERITAGE OF THE NATION. *Sci. Monthly* 27: 97-124, illus. August 1928.

"Soil wastage by erosion is the most serious problem relating to land utilization in this country . . . It is sheet erosion that is doing most damage to our farm lands and over-grazed pastures . . . Abnormal soil-washing, with the helpful assistance of man, is doing more damage to the agricultural lands of the nation than all other processes, both natural and artificial combined." The terracing of sloping lands, reclamation of gullies, reforestation, careful and planned planting, and continued research as to erosional processes are fundamental and necessary parts of the whole problem of soil-erosion control.

—AND CHAPLINE, W. R.

(131)

SOIL EROSION A NATIONAL MENACE. U. S. Dept. Agr. Cir. 33, 36 pp., illus. 1928.

"This circular is in two parts, the first dealing, under the heading of 'some aspects of the wastage caused by soil erosion,' with the problem as a whole while the second part is devoted specifically to soil erosion on western grazing lands."—*Expt. Sta. Rec.* 59: 207. 1928.

BLACK, A. G.

(132)

THE LONG TIME SIGNIFICANCE OF A SOIL CONSERVATION PROGRAM TO LIVESTOCK PRODUCERS. 16 pp. [Washington, D. C.] 1936. [Mimeographed.]

The author deals with the problem of crop shifting, and the changes in crop production which result therefrom. He also discusses the general effects upon the livestock industry. Address delivered at annual meeting American Institute of Cooperation, Urbana, Ill., June 19, 1936.

BLACKWELL, C. P. (133)

IMPORTANCE OF SOIL CONSERVATION DURING PERIODS OF ECONOMIC DEPRESSION. Okla. Agr. Expt. Sta. Current Farm Econ. 6 (2): 22. 1933.

"This erosion is taking off the organic matter and the available plant food from our surface soils . . . The remedy for this condition is, first of all, the stopping of erosion. This may be done by terracing, strip farming, planting to sod, or other types of erosion control . . ."

RESEARCH PROGRAM OF SOIL EROSION IN OKLAHOMA. Okla. Sta. Cir. 79: 8-9. 1931. (134)

This paper, read at the second Southwest Soil and Water Conservation Conference, outlines the Oklahoma program and gives some estimates on the losses in the State through erosion.

BOHN, FRANK. (135)

THE REAL AMERICAN DESERT. Today 2 (24): 16-17. illus. October 6, 1934.

The author gives estimates on soil losses and resulting farm abandonment in the Midwest and Southwest where erosion has become greatly accelerated in the last 10 years. A description is also given of the work and program of the South Tyger Valley erosion project in South Carolina.

BREDERODE, F. H. VAN. (136)

SOIL WASH. Indische Mercur 37: 795-797. September 1914.

Rain can be a great friend to the land—and a great enemy, especially in the tropics. The writer goes on to describe the way in which soil-washing is combated in Java and Sumatra, particularly in Bantam, quoting various authorities.

BREGER, JOHN T. (137)

ORCHARDING IN RELATION TO SOIL CONSERVATION. Va. Fruit 25: 135-140. January 1937.

Soil conservation has "a very important place in orchard practice because of the desirability . . . of planting orchards in rolling or sloping sites" to insure adequate drainage.

BRINK, WELLINGTON. (138)

FLASHES FROM THE TEXAS FRONT. Soil Conserv. 1: 3-8, illus. June 1936.

The author's subject is soil erosion and conservation.

A NOTE ON EROSION CONTROL IN THE PIEDMONT. Soil Conserv. 1: 7-8, 11, illus. March 1936. (139)

On soil erosion and conservation. "Piedmont farmers are applying the lessons of the project demonstrations . . ."

BRISBIN, JAMES S. (140)

THE BEEF BONANZA; OR, HOW TO GET RICH ON THE GREAT PLAINS. 222 pp. illus. Philadelphia, J. B. Lippincott & Co. 1881.

A description of the livestock industry in the West in the days of the cattle boom. "The great cattle kings claim that the country is utterly unfit for cultivation, to which the farmers reply by ploughing up a strip on its eastern edge every year some ten miles wide, and raising good crops."

BRYAN, E. A. (141)

WHY IS EROSION ATTACKING PALOUSE HILLS? Wash. Farmer 66: 482. June 30, 1932.

States that despite the fact that soil of the Palouse section has a tendency to resist washing, erosion of hillsides is becoming more evident yearly. The author considers the Palouse hills too steep for terracing and maintains that the problem must be solved by "the closest and wisest attention to the condition of the soils, and the times and methods of tillage and the seasons in which it is done."

BUCHANAN, JAMES P. (142)

OUR NATIONAL HIGHWAYMAN. Natl. Repub. 17: 32-33, 49, illus. May 1929.

"It has been conservatively estimated that the value of the soil our country loses each year by erosion amounts to \$2,000,000,000, and the

farmers of the nation suffer a direct primary loss of two hundred million a year by reason of the destructive depredations of this master criminal—erosion . . .” This article presents data on the extent of erosion in many sections of the United States and discusses the problem on a national basis. The author comments on the establishment of seven demonstration stations on different soil types in this country.

BUCHANAN, JAMES P.

(143)

SOIL EROSION. Cong. Rec. pp. 4261-4262. February 25, 1929.

“Uncontrolled surface water is the enemy of man. Controlled, it is a priceless blessing.” The great damage and loss of fertile soil to the United States through soil erosion is stressed. The establishment of demonstration stations on different soil types in various States of the Union is advocated “to the end that this great problem might be carefully studied and solved.”

BUIE, T. S.

(144)

CONSERVING NORTH CAROLINA SOIL. U. S. Soil Conserv. Serv. SCS-RB-2, 12 pp. 1936. [Mimeographed.]

An address given at the annual Farmers' Field Day, Piedmont Experiment Station, Statesville, N. C., August 13, 1936. In discussing erosion in North Carolina and other southern sections of the Piedmont the author compares conditions with those in Europe and draws attention to the marked acceleration of erosion in recent years. The inception of Government work and research is outlined and the objectives of the Soil Conservation Service are described. Valuable data on control methods are given.

(145)

COORDINATED ATTACK ON ENEMY ESSENTIAL TO CAMPAIGN. The Land, Today and Tomorrow 2: 34-36, illus. January 1935.

The author shows that 35,000,000 acres of land have been laid waste in the United States by unchecked soil erosion and urges full cooperation with the Soil Erosion Service program in order to solve the problem.

(146)

THREE MOVES—NO GAIN. Fert. Rev. 11: 8-9, illus. April-June 1936.

Discusses abandoned farms and soil erosion. States that the program for farm reclamation “as planned by the Soil Conservation Service has as its motive the rebuilding and maintenance of the soil for more profitable production in the immediate future.”

(147)

WHAT MAKES THE RED HILLS RED. Better Crops and Plant Food 21: 12-15, 38-40, illus. December 1936.

The destruction of the rolling lands of the South by erosion is described and the virgin Piedmont is contrasted with the Piedmont of today. “The greater part of the topsoil already has been carried away, and where deep gullies are not present they are rapidly forming.” The various benefits of a soil conservation program are pointed out.

BUTLER, O.

(148)

CONSERVATION AT THE FORKS. Amer. Forests 43: 109-110, 143. March 1937.

The author analyzes the proposed reorganization of the Federal Government which raises questions vital to agriculture, forestry, and other fields of conservation.

CALDWELL, MILLARD F.

(149)

SOIL CONSERVATION PROGRAM IN THE SOUTHERN REGION FOR 1936. Cong. Rec. pp. 4947-4949. April 3, 1936.

A portion of an informative series of questions and answers compiled by the Department of Agriculture for the purpose of illustrating the operation of the new soil conservation program in the southern region for 1936 is included, as follows: Purposes of the program, putting the program into operation, definitions, crop classification, establishment of bases, administration.

CANNON, C. (150)

LOOKING DOWN ON EROSION DAMAGE: ONE FARM PROBLEM THAT'S PLAIN FROM A MILE IN THE AIR. *Mo. Ruralist* 73: 3, 21. August 15, 1931.

The writer took an airplane ride and saw that "the washes and gullies stretch through the farms like veins through the body, and their extent is appalling." He contends that after seeing such effects of erosion any man who owns a farm "would return home eager to plan a system of crop rotation and permanent pasture; to supervise his plowing to follow the contour of the hills and skip the draws; and to fight the gullies with every resource at his command."

CAPPER, ARTHUR. (151)

TWO PROGRAMS TO AID EMERGENCY RELIEF. (Editorial.) *Capper's Farmer* 45: 1. July 1934.

The writer discusses two matters related to permanent agricultural relief—erosion control and pasture development. "These two more permanent programs for agricultural rehabilitation . . . should go right along with the emergency relief program of the Federal Government . . . each will help the other. I earnestly recommend both to farmers everywhere."

CARTER, BOAKE. (152)

THROUGH THE HILLS. *Conservation* 3: 41-43. January-February 1937.

Condensed from radio broadcast in the spring of 1936. The preservation of forests for the conservation of soil and water was the subject of this broadcast. "Large trees prevent soil erosion" and "it takes just one hundred years to create one inch of soil" are two pertinent facts stated.

CARVER, T. N. (153)

WHAT THE STATES ARE DOING TOWARD THE CONSERVATION AND IMPROVEMENT OF SOIL FERTILITY. 8th Internatl. Cong. Appl. Chem. (Washington and New York, Orig. Commun. 24, XIb, pp. 47-57, illus. 1912.

"The scope of the inquiry and its subdivisions are indicated in the accompanying chart, and may be easily understood by a brief glance at the headings of the various columns. Though the paper has to do with the work of the various states in preserving the fertility of the soil, and though the International Association of Applied Chemistry is interested primarily in the chemical elements of soil fertility, yet it seems desirable to include in the scope of this inquiry certain enterprises which have to do directly with physical rather than chemical conditions." Irrigation and drainage in relation to the States and legislation are discussed. State work with regard to erosion control is considered, and certain types of conservation enthusiasts are criticized.

CHAMBERLAIN, T. C. (154)

SOIL WASTAGE. *Pop. Sci. Monthly* 73: 5-12. July 1908.

The history and development of soil and its wastage are treated. "When our soils are gone, we, too, must go, unless we shall find some way to feed on raw rock or its equivalent . . . The key to the problem lies in due control of the water which falls on each acre . . ." Soil management and crop selection for conservation are discussed.

CHARLES, TUDOR. (155)

RAIN-CATCHING FIELDS AND HILLSIDES. *Kans. Farmer* 74: 3, 18, illus. September 12, 1936.

Moisture conservation in Kansas as practiced by various farmers is outlined.

CHASE, STUART. (156)

RICH LAND, POOR LAND; A STUDY OF WASTE IN THE NATURAL RESOURCES OF AMERICA. 361 pp., illus. New York, McGraw-Hill Book Co., Inc. 1936.

The author presents a bird's-eye view of the United States before the coming of the white man. He shifts the scene to 1936 and a land far different, due to the loss of soil, water, and mineral deposits. He discusses the causes and effects of this condition and suggests remedies in the light of published reports by recognized authorities. Selected bibliography, pages 351-352.

CHASE, STUART.

(157)

WHEN THE CROP LANDS GO. Harper's Mag. 173: 225-233, illus. August 1936. [Also in Scholastic 29 (2): 5-6, 16. September 26, 1936.]

The author discusses soil erosion and soil-depletion types by contrasting geological erosion and erosion produced by man. "Geological erosion tends to be static; soil builds as fast or a little faster than water carries it away. Man-made erosion is dynamic and cumulative, and has no end save destruction." The technique of controlling erosion is indicated through rotation of crops, terracing, contour plowing, strip cropping, check dams, and gully planting.

CHEW, A. P.

(158)

SAVE AMERICA FIRST. Atlantic Monthly 159: 194-203. February 1937.

"Soil conservation is a social problem; it is vain to wait upon individual action for a cure . . . The government has a responsibility, for the soil is the most irreplaceable asset of the people as a whole." The historical background of erosion in China and other countries is considered and contrasted with America's history of erosion and its causes. The writer contends that "means must be found to create a present interest in the conservation of soil values for the future."

CHI, CH'AO-TING.

(159)

KEY ECONOMIC AREAS IN CHINESE HISTORY AS REVEALED IN THE DEVELOPMENT OF PUBLIC WORKS FOR WATER CONTROL. 168 pp., illus. London, George Allen & Unwin, Ltd. 1936.

This book presents an important aspect of Chinese economic history, approached from the viewpoint of political power with reference to regional relations. It is formulated in terms of the development of agricultural productivity by irrigation and flood control and the evolution of a system of artificial waterways, primarily for the transportation of grain tribute to the seat of government. Partial contents: Chapter 2, Geographical Basis of Water-Control and Economic Regionalization in China; chapter 3, a Statistical Study of the Historical Development and Geographical Distribution of Water-Control Activities; chapter 4, Origin of Water-Control as an Economic Function of the Chinese State; chapter 5, The Loess Region and Central Huang Ho Basin as Key Area.

CHILDERS, L. E.

(160)

PARABLE OF THE COOKSON HILLS. Farmer-Stockman 49: 3, 10, illus. May 1, 1936.

Tells the story of land depletion in the Cookson hills area of eastern Oklahoma with resulting economic and social degeneration. Progress is described of development work in the form of highway construction, recreation camps, reforestation, wildlife control, and reclamation of overgrazed grasslands.

CHRISTIE, G. I.

(161)

SOIL EROSION STUDIES. Ind. Agr. Expt. Sta. Ann. Rept. 40: 19. 1927.

Soil erosion studies at the Paoli (Ind.) experimental field are reported briefly.

CLAYTON, E. S.

(162)

CONTROL OF EROSION ON ORCHARD LANDS. Agr. Gaz. N. S. Wales 46 (1): 3-7, illus. 1935.

The conservation of moisture in rolling-country orchards is an important problem. The use of contour banks, green-manure crops for protection from erosion, and the manner of planting new orchards are discussed.

— and GREEN, J. L.

(163)

SOIL EROSION; CONTROL ON COASTAL CULTIVATION AND GRAZING LANDS. Agr. Gaz. N. S. Wales 45 (7): 361-366, illus. 1934.

"Damage caused by soil erosion on the coast is rapidly increasing . . . Sheet erosion and gullying are carrying away the finer and more fertile portions of the soil." Contour banks, if properly constructed, will prevent erosion and allow the land to be cultivated satisfactorily. The construction of these banks and a home-made implement for locating the line of them are described and illustrated.

- CLINTON, L. A. (164)
THE MOISTURE OF THE SOILS, AND ITS CONSERVATION. N. Y. (Cornell) Agr. Expt. Sta. Bull. 120, pp. 479-498. 1896.
"The insufficient water supply is not due to lack of rainfall, but to its unequal distribution . . . In New York, with a rainfall of from 34 to 40 inches, nearly one-half passes off by surface drainage and is lost so far as immediate plant growth is concerned. Not only is the water lost to the crops, but it carries with it much of the soluble plant food of the surface soil . . . This surface flow of water must be prevented . . . The means by which moisture may be conserved are: by plowing and tillage, mulches, underdrainage, lessening the influence of winds, applications of lime, salt, etc., rotation of crops to increase humus, adapting the crop to the soil."
- CLYDE, A. W. (165)
HOW CAN WE STOP SOIL WASHING? METHODS THAT HAVE WORKED IN PREVENTING EROSION ON CORN BELT FARMS. Wallaces' Farmer 53: 1099, illus. August 10, 1928.
The author quotes data from the Missouri Agricultural Experiment Station: "Most of the worn out lands of the world are in their present condition because much of the surface soil has washed away, and not because they have been worn out by cropping." Sheet and gully erosion are discussed in detail.
- COALE, J. S. (166)
CROPS, GRASS, AND CIVILIZATION. Com. Fert. 55: 16, 18. July 1937.
This address was presented on the National Farm and Home Hour from station WMAL, in Washington, D. C., on June 11, 1937. "In closing may I emphasize most earnestly that our soils are our most valuable and most permanent heritage not only to our agriculture but to our entire civilization."
- COBB, C. A. (167)
TEXAS-OKLAHOMA RANGE CONSERVATION PROGRAM. Cattleman 23: 17-20, illus. February 1937.
"A special feature of the program is the payment to be made for deferred grazing, which means withholding from grazing a portion of the ranch during the period from the time vegetation starts growth in the spring until seed has matured in the fall for the purpose of permitting the natural reseeding of range land." A complete list of practices for which payments will be made, with the rates and condition of payment, is given.
- COLLIER, C. W. (168)
ANCHORING THE GOOD EARTH. Sugar News 17: 150-151. April 1936. [Condensed from New Republic by Reader's Digest.]
The author cites the case of the city of Antioch as an example of the results of soil erosion. "Arcadia has been changed to Desolation." The neglect and misuse of land, and the common-sense plans for its preservation and rehabilitation are discussed.
- (169)
AT LAST—A SOIL EROSION PLAN. New Repub. 83: 68-70. May 29, 1935.
The writer traces the history of erosion from ancient times and deplores erosion conditions in the United States. "Vast quantities of silt, originating from eroded lands, are being deposited in a multitude of reservoirs, threatening the agricultural and power resources dependent thereon . . . To meet the menacing situation, the administration, in 1933, launched the first broadly conceived and widespread practical program ever undertaken in the United States for permanent protection of its land resources." The demonstration procedure to be followed by the Soil Conservation Service is described.
- (170)
IN PROSPECT. The Land, Today and Tomorrow 1: 7-8. October 1934.
Describes the launching of eight soil-erosion projects in various parts of the country.

- COLLINS, H. H., JR. (171)
GEOLOGY AND SOIL CONSERVATION. *Smilodon* 3: 1-3. June 1936.
A study of accelerated erosion as contrasted with normal geological erosion. The author states that at present "the problem is to decelerate erosion and deposition; in fact, to reduce these processes as closely as possible to their geological norms. This is the task set before us. The profession of soil conservation is still in its infancy . . . Control is restricted to no one formula of treatment . . . agronomy, revegetation, woodland management, erosion surveys, wildlife management, and engineering are all part of the program."
- COLLINS, W. O. (172)
THE EFFECT OF EROSION ON SOILS. *Ga. Dept. Forestry and Geol. Devlpmt. Forestry-Geol. Rev.* 6: 2. September 1936.
"The two main factors that influence the amount of soil lost are the slope of the land and the character of the rain." Recommendations for conserving soils and the treatment of land through rotation and fertilization are made.
- COMAN, E. T., JR. (173)
A COLLECTION ON WATER PROBLEMS. *Library Jour.* 61: 312-313. April 15, 1936.
Gives a general description of the Claremont College Library collection of literature on the water problem of California which contains 1,497 items of value to students of political science, hydrology, water law, and water conservation.
- COMMITTEE OF SOIL CONSERVATION. (174)
REPORT OF SECRETARY'S COMMITTEE ON SOIL CONSERVATION. 48 pp. 1935. [Mimeographed.]
This report consists of detailed recommendations for the furtherance of the soil conservation program. The cooperative relations of various Government bureaus are defined.
- CONDEA, GEORGE EVERT. (175)
THE CONSERVATION OF NEBRASKA'S WATER RESOURCES. *Nebr. Univ. Conserv. Survey Div. Bull.* 3, 19 pp. 1930.
This bulletin proposes policies on water conservation and related subjects. The writer discusses run-off and erosion (pp. 8-9) and tells how erosion and water conservation problems in upland regions depend on each other for a solution.
- CONFERENCE OF GOVERNORS ON CONSERVATION OF NATURAL RESOURCES. (176)
PROCEEDINGS OF A CONFERENCE OF GOVERNORS IN THE WHITE HOUSE, WASHINGTON, D. C., MAY 13-15, 1908. 60th Cong., 2d sess. House Doc. 1425. Washington, Govt. Print. Off. 1909.
During the third session of the conference James J. Hill spoke on the natural wealth of the land and its conservation, discussed the deterioration of land owing to faulty farm practices, and outlined some of the principal issues at stake in the better conservation of national resources, more especially the land. T. C. Chamberlin spoke on the subject of soil wastage and discussed soil washing and moisture conservation among other aspects of his subject. Contour cultivation, strip cropping, reservoirs, and similar devices to limit the wash of slopes were advocated. Lyman E. Cooley contributed a statement on our water resources, in which he discussed surplus waters, the Mississippi Valley, the continental interior, and the water-way system. Chase S. Osborn in discussing the conservation problem spoke of the urgent necessity for at once inaugurating a policy of wise conservation of forests, soil, coal, iron ore, water powers, and other natural wealth. Charles Van Hise spoke on conservation of soils. He referred to Hill's paper with appreciation, amplifying his statements by speaking of soil erosion and crop rotation.
- CONWAY, W. J. (177)
LOWDEN BACKS SOIL CONSERVATION PLAN AS PERMANENT POLICY. *Amer. Farm Bur. Fed. Off. News Letter* 15: 1, 4. February 4, 1936.
The writer reports an interview with Frank O. Lowden, who anticipates a permanent farm program within the framework of the Constitution, and

quotes Lowden as follows: "The land of any country is the basis upon which its civilization must rest . . ."

- COOK, R. L. (178)
EROSION DEPLETES OUR BEST LAND. Mich. Farmer 187: 5, 28, illus. February 13, 1937.

Erosion control is a problem for the individual farmer as well as for the Nation. Sand hills need grass; soils subject to wind or water erosion should be planted in rotation crops that will provide an efficient vegetative cover throughout the year; gullies must be checked and reclaimed.

- COOKE, M. L. (179)
A CHALLENGE TO SAVE THE BASIS OF OUR LIFE. N. Y. Times Mag. pp. 1, 6-7, 27, illus. March 21, 1937. [Reprinted in Cong. Rec. 81: 4035-4036. April 5, 1937.]

Erosion is slowly draining our greatest heritage—the black topsoil. The author deprecates the inefficiency and lack of effectiveness of "piecemeal policies" and outlines a broader program to preserve the soil. The present work of various State and Federal agencies is discussed.

This article was printed in the Congressional Record under the title "A Challenge to Save." The author stresses the need for concerted national action to control floods and dust storms, gullied hillsides, and all other forms of erosion; and the need for getting back the "little waters, ponds, swampy places, long grass, and trees that used to make the tempo of the moving water less rapid." He goes on to say: "We cannot force conservation upon the American people. The job will be done by the willing cooperation of the people on the land, together with the cooperation of people in towns and cities who have been made to see that their welfare is tied up with that of the country people, or it will not be done at all . . . I look to youth to carry on the work we older people have tried to set going."

- (180)
TWENTY YEARS OF GRACE. Survey Graphic 24: 276-282, illus. June 1935.

"Only twenty years—then the disease of soil erosion, already blighting a billion of our good acres, will be beyond cure. The chairman of the Mississippi Valley Committee here shows the sort of plans and effort we must make to win out against this destroyer of our 'virile national existence.' Unrelated projects will not serve: 'land, water and people go together.'"—Editor's note.

- COPELAND, J. T. (181)
TYPES OF SOIL WASHING AND HOW TO COMBAT THEM. Ag-Ex News 3: 4-5, illus. January 1934.

An explication of the four general forms of soil erosion—sheet washing, fingering, gullies, gulches—is presented. Results of different soil treatments in Missouri are given. "The ultimate aim is to prevent the erosion menace and simultaneously to contribute a means of flood control."

- COX, H. R. (182)
SOIL EROSION: \$200,000,000 LOSS. N. J. Agr. 12: 7-8, illus. March 1930.

This article measures erosion damage in the United States. The various types of erosion are described, and preventive measures are outlined.

- COYLE, D. C. (183)
WASTE, THE FIGHT TO SAVE AMERICA. 96 pp. Indianapolis, Bobbs-Merrill Co. [1936.]

Dramatizes the economic and social waste which characterizes present-day America and popularizes technical engineering problems in chapters on mud, dust, water, land, and power. The author attempts to arouse Americans to see facts, so that no one may remain indifferent to such problems as soil erosion, flood control, and conservation of natural resources.

- CRANE, J. L., AND OLCOTT, G. W. (184)
THE CONSERVATION OF IOWA'S SOIL. Iowa Bd. Conserv. and Iowa Fish and Game Comm. pp. 41-46, illus. Des Moines. 1933.

Chapter V of this report describes the nature of soil erosion in Iowa and states that the main factor in erosion control is the restoration and preservation of vegetative cover. Erosion of lake sides and banks is considered.

CRAVEN, AVERY O.

(185)

EDMUND RUFFIN, SOUTHERNER. 283 pp. New York, Appleton. 1932.

Edmund Ruffin is described as "the greatest agriculturist in a rural civilization." A Virginia gentleman farmer, he was 19 years old when he "took over the responsibilities of a planter on weary lands." Observers had noted that tobacco growing for immediate high yields meant soil exploitation and ultimate abandonment of once-fertile fields. The rotation of crops failed, as clover and other legumes would not grow on poor lands, and "travellers and natives alike in this period (1815-1830) agree on the impression that an angel of desolation had cursed the land." Ruffin's lands responded to a treatment of marl spread over them and "a new era in the agricultural history of the region had dawned." His conception of soil fertility as a dynamic and not a static condition gives him a modern standing. "Edmund Ruffin has good claim to be called the father of soil chemistry in America." His monthly agricultural paper, the Farmers' Register, encouraged practical farmers to write articles. The use of marl, the preservation and use of barnyard manure, and the growing of clover all proved his knowledge, and he developed a well-planned system of drainage. His was the most advanced rotation of crops to be adopted: corn, wheat, clover, wheat, and pasture, and later a six-field system—corn, with peas broadcast and plowed under, opened a series which included wheat, clover mowed, clover grazed and plowed under, wheat, and pasture. His lands become more and more fertile.

CRICKMAY, GEOFFREY W.

(186)

SOIL EROSION AND LAND PLANNING IN GEORGIA. Forestry-Geol. Rev. 5:7-8, illus. September 1935.

"In Georgia, unrestricted soil erosion is rapidly changing arable fields into barren gullies and fertile land into sub-marginal land. Such soil wastage was directly responsible for economic collapse in Central America (Mayan culture), Asia Minor, and China." The author discusses the main types of erosion, climate, rainfall, and the transporting power of running water with respect to the soils of Georgia. Work on Federal demonstration areas is discussed.

CROUCHER, H. H.

(187)

SOIL EROSION IN THE BLUE MOUNTAIN RANGE. Jour. Jamaica Agr. Soc. 41: 270-271. May 1937.

Attempts to counteract the soil-washing problem by coffee planters of Jamaica include mulching, planting overlook beans, and digging trenches. The author suggests precautionary measures, among them terracing and strip cropping.

CURRIE, J. H.

(188)

THE CONSERVATION PLAN GETS UNDER WAY. Pacific Rural Press 131: 640. May 16, 1936.

The writer reviews some of the basic thoughts behind this plan and then outlines some of the details applicable to various agricultural sections.

SANTA CLARA'S WATER TABLE'S RISE. Pacific Rural Press 132: 114, illus. August 1, 1936.

The \$3,000,000 water-conservation project of Santa Clara Valley Water Conservation District is almost complete. Underground water tables have risen from 10 to over 30 feet this season.

CURTIS, HUGH.

(190)

CONSERVATION IS YOUTH'S NEW GOAL. Successful Farming 34: 18, 20, 56-57. January 1936.

Describes the activities of the Nation's youth camps and clubs, organized in various midwestern sections in the interest of successful rural living. Interest shown by boys and girls in soil erosion control methods and wild-life conservation is stressed.

- CUTLER, J. S. (191)
OHIO VALLEY LAUNCHES EXTENSION PROGRAM. Soil Conserv. 3: 34, 50. August 1937.

This is a discussion of soil conservation work already done and future plans by representatives of the Soil Conservation Service from Kentucky, Ohio, Indiana, Michigan, and Washington, D. C., at a conference held in the spring of 1937 at Dayton, Ohio.

- DACHNOWSKI-STOKES, A. P. (192)
PEAT LAND IN THE PACIFIC COAST STATES IN RELATION TO LAND AND WATER RESOURCES. U. S. Dept. Agr. Misc. Pub. 248, 68 pp., illus. 1936.

"This publication presents the results of investigations carried out in California, Oregon, Washington, and parts of Idaho in the interests of regional approach in the utilization of peat land and the conservation of water supplies." The relation of the study to soil erosion is discussed in the summary.

- DACY, GEORGE H. (193)
AMERICA'S TWO BILLION DOLLAR FACE-WASH. Rural Prog. A(2): 20. December 1934.

"Twenty-one times more plant food is wasted in the soil carried away in rain-wash than is used in growing our sum total of crops . . . Erosion is a devastating chiseler which works tirelessly, altering the topography of our agricultural terrain." The author describes the largest man-made gully in this country, near Lumpkin, Ga., begun by a small rivulet cut by the drip from a barn roof. "Strip farming is a vegetative system of erosion control which applies in one form or another to all kinds of soil, to all degrees of slope, to all branches of agriculture and to all types of climate where there is enough rainfall to make plants grow." Bags of soil and seed placed at strategic points to obstruct run-off in controlling small gullies, and large gullies planted to willows, locusts, and honeysuckle have proved successful.

- DARLING, B. (194)
DYNAMITE HELPS HALT THE MARCH TO THE SEA. Ag-Ex News, 3: 1, 9, illus. January 1934.

"The Mississippi delta is the graveyard of thousands of runaway farms. Here is the resting place of countless tons of precious topsoil." Dynamite to blast gully banks is used in many States by C. C. C. camps to control erosion. Details of the procedure are given.

- DARLING, J. N. (195)
DESERT MAKERS. Country Gent. 105: 5-7, illus. October 1935.

The author criticizes various conservation measures and the lack of cooperation in conservation as a national principle. He points out the damage done to the country in general by ill-conceived water-control projects, lack of river protection, and bad drainage projects. The damage to wildlife is stressed. "A national program for conservation of America's natural resources is essential."

- MAN'S BLIND ATTACK ON NATURE. Better Homes and Gard. 14: 31, 121, 122, 123. April 1936. (196)

Asserts that certain water-conservation projects are doing more harm than good and gives as an example the Keokuk Dam in Iowa which has resulted "in a barren life-desert 31 miles long without either vegetable or animal growth, useless for recreation." Other projects criticized are the Santee-Cooper power project in South Carolina and the Currytuck Sound Canal in North Carolina.

- DAVENPORT, W. (197)
REVIVE US AGAIN. Collier's, pp. 10-11, 45-46, illus. March 31, 1934.

The writer discusses the future of land and water conservation in the United States. It needed the depression to turn the legislative mind to conservation, and the writer reviews the whole question from 1812 to the present administration. Erosion, the enemy of the land, destruction of wildlife on farms, and the need for the return of all nonarable lands to what Nature intended them for, are discussed.

DAVIS, C. C.

(198)

REVERSE ENGLISH. TIGHT LITTLE ISLE HAS ITS OWN LEFT-HAND FARM PROBLEMS. *Prairie Farmer* 108: 1, 30. June 6, 1936.

Discusses British methods of soil conservation such as the efforts of farmers to plow up grassland and put it into cultivated crops, and also summarizes the British farm-relief program.

DAVIS, R. O. E.

(199)

ECONOMIC WASTE FROM SOIL EROSION. *U. S. Dept. Agr. Yearbook* 1913: 207-220. 1913.

Table of contents: The Natural Process of Erosion; Action in Forest; Action on Cleared Land; Relation to Lumbering; Relation to Mining; Relation to Power Development and Navigation; Relation to Agriculture; Utilization of Rainfall; Natural Recovery from Erosion; Reclamation; and Methods of Prevention.

(200)

EROSION IN THE APPALACHIAN AND PIEDMONT REGIONS. *Amer. Forestry* 25: 1350-1353, illus. 1919.

Types of soil, lumbering operations, climatic conditions, and the various factors influencing erosion are discussed. Figures are quoted on soil waste through the rivers of these regions. "Reclamation is of two classes: lands reclaimed for cultivation and those for forests. The same methods that are used in prevention must be used in reclamation."

DIAS, C. E. A.

(201)

SOIL EROSION, WITH SPECIAL REFERENCE TO RUBBER. *Trop. Agr. [Ceylon]* 70: 319-325. May 1928.

"Erosion is the removal of soil material by air or water in motion. I shall deal only with erosion caused by water." The cause of erosion, the slope or topography of the land, the texture and structure of the soil, the vegetative covering, the character of the rainfall, the results of erosion, and methods of prevention and reclamation are treated.

DICKEY, P. B.

(202)

SAVING CALIFORNIA'S TOPSOIL. *Pacific Rural Press* 133: 611. May 1, 1937.

A brief outline of erosion-control measures needed in California, where there is wide variety of soils and equally wide variations in climate and rainfall. Cooperation between scientists and farmers is urged.

DICKSON, R. E.

(203)

EXPERIMENTAL WORK ON SOIL EROSION AND WATER CONTROL IN TEXAS. *Okla. Sta. Cir.* 79: 16-17. 1931.

Discusses the work at the Spur station and its application to the western portion of the State.

"DING."

(204)

CONSERVATION A TYPOGRAPHICAL ERROR. *Rev. of Reviews* 104: 35-37. November 1936.

An examination of the administration's "extravagant expenditure toward the accomplishment of a national conservation program" is made. The author concludes that "in the realm of the New Deal the word conservation is a typographical error. The s and v have been transposed." Soil Conservation is regarded as No. 1 among the many needs of the North American Continent.

[DIXEY, F., CLEMENTS, J. B., AND HORNBY, A. J. W.]

(205)

THE DESTRUCTION OF VEGETATION AND ITS RELATION TO CLIMATE, WATER SUPPLY, AND SOIL FERTILITY. *Nyasaland Dept. Agr. Bull.* 1, 16 pp. 1924.

"Part 1 of this publication, by F. Dixey, deals with the general effects of the destruction of vegetation, with particular reference to soil erosion. Part 2, by J. B. Clements, deals with the relation of forest vegetation to climate, water supply, and soil erosion. Part 3, by A. J. W. Hornby, deals specifically with the erosion of arable soil in Nyasaland and methods of prevention."—*Expt. Sta. Rec.* 53: 117. 1925.

- DOBBY, E. H. G. (206)
 AGRARIAN PROBLEMS IN SPAIN. *Geogr. Rev.* 26: 177-189, illus. April 1936.
 With the geographical background as an approach the author discusses the present rural social system and situation in Spain. Some serious problems which have accumulated through the centuries without directed effort are: Immense acreage holdings in some sections with the great majority of the people in possession of but small impoverished lands or none at all; a deplorable irregularity of land tenure; relative drought over a high percentage of Spain; seasonal crop demand, which calls for migrant labor; uneconomic management of marginal land, and reckless deforestation. "The remedies . . . can be efficacious only when a soundly constructed scheme to embrace the whole perspective of Spanish agrarian difficulties is unremittingly pursued over a considerable period of years."
- DODD, D. R. (207)
 EROSION CONTROL IN OHIO FARMING. *Ohio Agr. Col., Ext. Bull.* 186, 40 pp., illus. 1937.
 Causes of soil erosion and means of control are discussed. Methods of terracing, rotations, strip cropping, gully control on crop and pasture land, tree planting, cover crops, and special treatment for badly eroded land are covered at length. Types and extent of soil erosion together with salient facts about erosion are discussed.
- DU TOIT, E. (208)
 FURTHER ASPECTS OF THE SOIL EROSION PROBLEM. *Farming in So. Africa* 9: 295-296, illus. August 1934.
 The evils of sheet erosion are greater even than those of donga or gully erosion according to this writer. The dangers of overgrazing and the necessity for good pasture management are stressed.
- DUFFUS, R. L. (209)
 THE FIGHT TO 'SAVE A CONTINENT.' *N. Y. Times Mag.* pp. 1-2, 15, illus. July 19, 1936.
 This article indicates that recent disasters have emphasized the danger of soil erosion to the Nation's farmland and tells how "the conservation program is seeking 'partnership with nature'."
- WHEN WIND AND WATER STRIKE AT MAN. *N. Y. Times Mag.*, pp. 1-2, 25, illus. February 7, 1937. (210)
 Describes the ravages of droughts, floods, and wind storms during recent years and indicates control policies of national scope. The work of the T. V. A. in flood control is discussed.
- DUNCAN, RICHARD M. (211)
 SOIL EROSION. *Cong. Rec.*, pp. 1371-1373. Feb. 3, 1936.
 The speaker stated that he wished to give a picture of the soil erosion situation as he saw it: ". . . just what has been happening to our agricultural lands as a result of erosion and just how little we have realized its destructive force." He described conditions in his own State of Missouri, and suggested remedies, among them crop rotation, proper planting, terracing of fields to shorten slopes, stopping washes in cultivated fields, and fertilization. Farmers should "form cooperative organizations for the development of conservation projects; to acquire, on a cooperative basis, machinery necessary to do the work and to have the benefit of the knowledge of a trained expert on the subject, the latter, of course, without cost to them."
- EASTMAN, E. E., AND GLASS, J. S. (212)
 SOIL EROSION IN IOWA. *Iowa Agr. Expt. Sta. Bull.* 183, pp. 345-391, illus. 1919.
 "The nature of soil erosion, its causes and effect with respect to conditions in Iowa are discussed, and suggestions made relative to the control and prevention of erosion, with particular regard for methods successfully employed in different parts of the State . . . The estimated cost of installing the various control methods outlined is presented in each case."—*Expt. Sta. Rec.* 40: 717. 1919.

EDEN, T.

(213)

SOIL EROSION. Imp. Bur. Soil Sci. [Harpenden, England] Tech. Commun. 28, 30 pp., 1933. [Abstract in Trop. Agr. [Trinidad] 11 (2): 35. 1934.]

"This technical communication aims at presenting in a concise form modern knowledge of the extent of soil erosion damage, its underlying causes and methods of prevention . . . The question of prevention is dealt with in general terms. Local circumstances must inevitably guide technicians and agriculturists in their choice of specific remedies, especially in the selection of crops and rotation. Two points of view have been prominent in the mind of the compiler; firstly, that of the scientific worker who may have soil erosional investigations in hand at his own station, and secondly, that of the propagandist officer who is striving to awaken the agricultural conscience in the matter. With these ends in view, data are quoted and methods reviewed in some detail which it is hoped will provide a reasonable conspectus of present conditions." The scope of the program of soil erosion investigations in the United States is given in a summary.

[ELLENWOOD, F. A.]

(214)

CONSERVATION AND SHEEP. Natl. Wool Grower 27: 12. March 1937.

The writer challenges a declaration, credited by the press to Ray Lyman Wilbur, president of Stanford University, to the effect that the future safety of California depends largely on the removal of sheep from its mountain areas. It is stated among other considerations that vegetative covering not only fails to hold back snow, providing for a water supply in the summer months, but actually causes it to melt sooner than if it lay on bare ground. He asserts that sheep are not harmful to mountain areas, as many ranges where sheep have been grazing continuously for 50 years are now in better condition than they were several years ago. He also states that many farmers raise sheep, not for profit ". . . but solely for increasing the fertility of the soil, which means more vegetation."

ELLISON, W. D.

(215)

WORK OF E. C. W. SOIL EROSION CAMPS IN ALABAMA, MISSISSIPPI, OKLAHOMA, AND TEXAS. U. S. Forest Service. [13 pp.], illus. February 1934.

The author states that conservation of soil and flood prevention are the objective of 29 erosion camps functioning in the above States under the E. C. W. He advocates gully control by tree, vine, and grass planting to be followed by construction of permanent dams. Protection of streams and bottom lands with brush dams and black locust seedlings is discussed.

ELROD, F.

(216)

WHY HAVE WE BEGUN CONTROLLING SOIL EROSION? Ga. Agr. 12: 7, 18. May 1935.

"Erosion is annually depleting our greatest resource, the soil, and at so rapid a pace that already it has ruined an immense amount of formerly productive land and rendered it unfit for cultivation." The writer concludes: "With the educated and enlightened people that comprise the United States there is no excuse to further allow our most valuable asset, the soil, to get away from us."

ELROD, LUTHER.

(217)

EROSION, ONE OF THE GREATEST PROBLEMS THAT FACES AGRICULTURE TODAY. Com. Fert. 50: 9-11, illus.. April 1935.

Describes the nature of erosion in the Piedmont and the control measures of the Soil Erosion Service.

EMERSON, F. V.

(218)

AGRICULTURAL GEOLOGY. 319 pp., illus. New York, John Wiley & Sons. 1920.

Soil erosion is discussed, pp. 140-149, 178-180, 219-222. Phases of the subject treated are the nature and factors contributing to erosion, topography, soils, drainage, gullying, and terracing.

FARRIS, N. F.

(219)

EXPERIMENTAL STUDIES IN SOIL EROSION. Penn State Farmer (M. R.) 1: 103, 124, 133, illus. May 1936.

"The Soil Conservation Service has been given the task of determining causes of soil erosion and developing means whereby it may be retarded or controlled. The work is composed of two distinct phases: first, research

investigations, and second, the revision of farming operations in various sections where erosion is most serious." Results of studies at the State College Experiment Station are given.

FECHNER, ROBERT.

(220)

THE CCC IN SOIL CONSERVATION. *Soil Conserv.* 1: 1-4, illus. January 1936.

General survey of accomplishment by C. C. C. in cooperation with the Soil Conservation Service. "Because a real service is being performed that not only is helpful to those directly engaged in it but offers opportunities not previously available to millions of our citizens, I am firmly convinced that the CCC has fully justified the faith reposed in it and that it is returning a value in full proportion to its financial cost."

FERGUSON, E.

(221)

TEARING DOWN THE WEST. *Yale Rev.* (n. s.) 25: 331-343. December 1935.

The history and spoliation of New Mexico through the introduction of stock by the Spaniards is reviewed. "Erosion in process may be seen anywhere. A hundred years ago, Mexico was beginning to realize that overgrazing was a problem on the Rio Grande." The work of conservancy engineers is outlined.

FICK, J. C.

(222)

HUMUS AND SOIL EROSION. *Farming in So. Africa* 6: 260. October 1931.

In this article the author describes how some of the best surface soils are washed away by storm water, and how clay soils are being converted into erodible sandy soils. He emphasizes the value of humus in preventing wind and water erosion because it binds the soil and increases its water-holding capacity.

(223)

WHEN THE SOIL CRUST IS WASHED AWAY. *Farming in So. Africa* 11: 6. January 1936.

Discusses erosion from the point of view of the veld farmer. States that "it is a mistaken idea that the former fertility of the soil may be restored by the application of fertilizers, for although these do supply the missing plant-foods, they are unable to provide the finer and, incidentally, the most important soil constituents—the clay and humus particles—and this is the very portion which washes away first and most readily, causing a deterioration in the soil structure . . . The results of experiments conducted in America in this connection are highly instructive. All the results were obtained from soil of the same type, on the same slope and with a consistently uniform gradient. Part of the soil had previously been used for lands and here the upper crust was completely washed away, so that the soil used for seed-beds in the experiment was the original sub-soil. This soil was compared with adjoining virgin soil which still retained its upper crust, and it was found that the former yielded only 500 lb. of wheat per morgen, as against 3,200 lb. per morgen, or six times as much, on the latter."

FISCHER, E.

(224)

SOIL EROSION. *Farming in So. Africa* 11: 200, 248. June 1936.

A discussion of the rainfall, topography, soil, and water losses, and the causes of soil erosion. The need for preserving vegetation and controlled grazing are stressed.

FISHER, M. L.

(225)

THE WASHED LANDS OF INDIANA: A PRELIMINARY STUDY. *Ind. Agr. Expt. Sta. Cir.* 90, 24 pp., illus. 1918.

"The nature and causes of soil erosion in the State are discussed and various methods for its prevention and for reclaiming washed areas are briefly described. The principal preventive measures are said to comprise strip farming, mulching the brow of steep slopes, skip plowing diverting the run off, and keeping the land in permanent vegetation. While the recovery of badly eroded land includes filling in the gullies with straw, cornstalks, weeds, brush, treetops, logs, and trees; the seeding of alfalfa or other hay and pasture plants, or the growing of wheat or corn; and the liming and preparing the seedbed for grasses, particularly redtop and Kentucky blue grass on denuded surfaces."—*Expt. Sta. Rec.* 41: 130. 1919.

FLEETWOOD, J. R.

(226)

MAKING A LIVING WHILE IMPROVING THE FARM. *Mo. Ruralist* 77: 3, 18, illus. March 7, 1936.

Outlines soil conservation operations in Missouri with the following objectives in view: (1) Maintenance of soil fertility; (2) avoidance of the effects of droughts and insects; (3) orderly use of crops grown; (4) provision for maximum carrying capacity for livestock; and (5) a decrease in flood damage. "If we look a bit closer into the ravages of erosion, we find more than gullies and loss of soil." The author outlines various measures for soil erosion control in which the Government, State, and farmers could cooperate.

FLEMING, B. P.

(227)

EROSION: A REAL MENACE IN THE SOUTHWEST. *Science* 78: 391-395. November 3, 1933.

"The problem of erosion in the southwest had its beginning coincident with our Anglo-Saxon occupation of this region. Marked vegetative changes have occurred on the vast ranges used for grazing." Arroyo floods are the cause of most of the erosion. Irrigation projects have destroyed the natural balance of streams and vegetation. The writer urges that the duties of the Forest Service be expanded, that authority and funds be given to it "for the control of erosion on the public lands which form the watersheds of our principal rivers." He contends that "a permanent civilization in these river valleys of the southwest must be founded upon control of the desert, just as methodically as we control the torrential rivers."

(228)

NATION-WIDE VIEW OF ESSENTIAL SOIL EROSION CONTROL MEASURES. *Agr. Engin.* 15: 278-279, illus. August 1934.

A retrospective account of accelerated soil erosion precedes a description of the policy of the Soil Erosion Service and its program. The author states that cooperation with farmers is being sought, practical programs are under way, and the greatest care is being exercised in making recommendations.

FLETCHER, S. W.

(229)

GLIMPSES OF RURAL AMERICA; BOULDER DAM AND AGRICULTURE. *Pa. Farmer* 114: 4. June 20, 1936.

The writer discusses the benefits of Boulder Dam project in erosion control and flood control but questions the advisability of adding several million acres of irrigated desert land to agricultural production under present conditions and governmental policies.

(230)

GLIMPSES OF RURAL EUROPE. THE VALLEY OF THE RHINE. *Pa. Farmer* 115: 287, illus. November 21, 1936.

Describes "unique agriculture" in the Rhine Valley. "At points the river gorge rises 1,000 feet above the river, with a slope of 45 degrees, or steeper. Through the centuries, the Germans have gradually transformed the river gorge into a garden. The face of the cliff, on either side, has been chiseled into a series of narrow ledges, or terraces. Soil has been brought up from below . . . and laid on these shelves about a foot deep. Two inches of shale have been spread over the surface to favor the absorption of rain and to prevent erosion. Grape vines have been planted, three or four feet apart . . . They stretch upward from the river brink to the top of the cliff, tier on tier, being held by brick or stone walls, cunningly laid to provide drainage without erosion."

FLORIDA DEPARTMENT OF AGRICULTURE.

(231)

EROSION OF SOILS. *Fla. Dept. Agr. Quart. Bull.* 27: 23-25. 1917.

The author points out the loss of nitrogen from the soil caused by heavy rains and urges crop rotations for erosion control.

FRANK, BERNARD, AND REID, R. L.

(232)

SOIL EROSION IN A MOUNTAIN COUNTRY. *Amer. Forestry* 42: 310-312, illus. July 1936.

The writers discuss the economic pressure on deforested and eroded lands of Cooke County, Tenn. "One reasonable solution of the problem is the

removal of these people to good farming land, to industrial communities, or to areas on which they can better grow food requirements and at the same time obtain part time employment in forestry, industry or other activities . . . The continued misuse of these nonagricultural mountainsides only serves to aggravate the uncontrolled run-off of water and the silting up of stream channels and more fertile lands below." Reforestation for erosion control is advocated.

FRAZER, ELIZABETH. (233)

OUR NATIONAL NO MAN'S LAND. Sat. Evening Post 200: 31, 177-178, 180-182, illus. September 24, 1927.

The writer refers to the public domain as the forgotten no man's land, a vast and valuable property which has been allowed to deteriorate year after year. President Theodore Roosevelt, in 1903, appointed a special commission for the preservation of the public domain. After 2 years of investigation and careful research the commission reported that the great bulk of the vacant public lands were extremely valuable for grazing. The report concluded: "Prompt and effective action must be taken, however, if the value of very much of the remaining public domain is not to be totally lost." The results of overgrazing are discussed, and the writer points out that it can be proved beyond doubt that some smaller floods are directly traceable to erosive action on watersheds that have been denuded of their forage by overgrazing.

FULLER, E. EDGAR (234)

A GILA RIVER GONE BERSERK. Soil Conserv. 1: 12-13, illus. October 1935.

Tells how denudation along the banks of the upper Gila River has resulted in eroded conditions that have caused the abandonment of many farms and siltation that is menacing the Coolidge Dam.

FULZ, M. G. (235)

TO CONTROL SOIL EROSION. PROBLEM IS NOT SO DIFFICULT TO SOLVE IF UNDERSTOOD AND PROPERLY HANDLED. Ind. Farmer's Guide 92: 23. December 5, 1936.

Soil erosion in its varied manifestations is reviewed and advice given for treatment. Crop rotations, humus, pasture crops, contour planting, terracing, and ditch construction are recommended.

GAPEN, C. E. (236)

EROSION CONTROL A NATIONAL FIGHT. Prog. Farmer (Ky.-Tenn. ed) 51: 8, 56, illus. February 1936.

Gapen sketches the beginning of soil erosion in the United States and its accelerated development in recent years. Early Federal research is outlined and a history of the Government's attempt toward control until the inception of the Soil Conservation Service is given. The work of the Service in the South is discussed.

(237)

FIGHT TO SAVE THE NATION'S SOILS. Prog. Farmer (Car.-Va. ed.) 51: 24. April 1936.

The author states that millions of acres have been damaged in the South by gullying and wind erosion, and sheets of water flowing down across the cultivated slopes have carried away the rich topsoil and points out the benefits of building Mangum terraces for the conservation of soil and water. A map showing eroded areas is included.

GAUSSEN, HENRI. (238)

A VIEW FROM CANIGOU, NATURE AND MAN IN THE EASTERN PYRENEES. Geogr. Rev. 26: 190-204, illus. April 1936.

A study of the eastern French Pyrenees terrain, presenting a geologic history, with a description of the land as affected by human occupation. The author says that "the vegetation of today as it would have been but for man's intervention, includes: 1. an essentially forest vegetation disposed in altitudinal zones according to the floristic resources of the region; 2. relicts of the glacial epoch preserved along the watercourse and about springs, and in the peat bogs; 3. xerothermic survivors preserved in dry microclimates. With the exception of the alpine zone, treeless by definition, the saline lands and perhaps some sandy patches, and rocks too precipitous or too dry, the country must have been completely forested."

GETB, H. V.

(239)

SOIL-EROSION AND MOISTURE-CONSERVATION INVESTIGATIONS. Tex. Agr. Expt. Sta. Ann. Rept. 45: 151-154. 1932.

Studies conducted at the Blackland Experiment Station revealed that plats planted to Bermuda grass lost no soil or water after the grass became well established; that strip cropping, together with contoured rows decreased run-off and erosion and tended to check the formation of gullies. Species of vegetation are discussed. "To be satisfactory for such purposes a plant should be long-lived, make a dense growth, possess a fibrous root system, be able to withstand severe and prolonged drouths, and grow well on infertile, badly eroded land."

GLASS, J. S.

(240)

SOIL EROSION ON FARMS. Kimball's Dairy Farmer 16: 859, 868, illus. November 15, 1918.

The causes of soil washing, control of washing, and temporary and permanent measures in gully control are discussed.

GOODWIN, P. W.

(241)

ANNUAL REPORT OF THE KALIMPONG DEMONSTRATION FARM . . . 1909-1910. 21 pp., illus. [Bengal.] 1910.

The situation and history, area, and elevation of the demonstration farm are given as well as detailed analyses of average samples of soil and subsoil. Data on rainfall are given in tables. Terraced land is compared with unterraced land as to crop production.

GRAY, L. C.

(242)

SOIL CONSERVATION AND IMPROVEMENT. In History of Agriculture in the Southern States to 1860, v. 2, pp. 800-807. 1933.

A discussion of soil erosion and soil conservation practices in the Southern States. The history of erosion is outlined briefly, and the early efforts of southern farmers to control it are described.

GRIST, D. H.

(243)

REPORT OF THE COMMITTEE ON SOIL EROSION, CEYLON. Malayan Agr. Jour. 19: 394-395. August 1931.

The denudation of tropical agricultural lands by soil erosion is discussed. The universal use of cover crops, further research work, education, and propaganda by lectures and school gardens are stressed as essential to a successful program of soil erosion control.

GROSS, C. E.

(244)

EROSION AND ITS PREVENTION. Iowa Engin. Soc. Proc. 1: 59-63. 1926.

"The author presents typical erosion problems that have claimed attention and the methods employed to solve them. Although cases mentioned apply to drainage problems, these methods, it is believed, could be applied along highways in side ditches wherever undue erosion occurs similar to that described." Not examined.

GUNN, R. V.

(245)

NEW FARM PROGRAM. Mich. Agr. Ext., Agr. Econ. News 9, 10 pp. 1936.

The new Soil Conservation Act is reviewed (pp. 9-10) and examples are given to clarify its terms. The two major objectives of the Act which are of direct interest to farmers are: (1) Preservation and improvement of soil fertility; (2) reestablishment and maintenance of farm income on a parity with the incomes of other groups of people.

GUSSAK, V. V.

(246)

SOIL EROSION SURVEY OF KOKHI TUNG STATE FARM. Sovetsk. Subtrop. 4: 23-40, illus. 1936. [In Russian. English summary, p. 40.]

"During recent years the necessity of controlling soil erosion in the U. S. S. R. has become constantly greater. Soil erosion surveys, the results of which are briefly given in this article, have been included in systematic research work for the first time . . . This survey showed that the chief factors in erosion are the relief, the rainfall, and the methods of cultivating the hill slopes . . ."

- GUSTAFSON, A. F. (247)
CONSERVATION OF THE SOIL. 312 pp., illus. New York, McGraw-Hill Pub. Co. 1937.

Contents: Soil Erosion; Results of Soil Erosion; Influence of Precipitation and Latitude on Soil Erosion; Influence of Slope and Soil on Erosion; Effects of Crops and Tillage on erosion; Rotation Crops; Contour Tilling and Strip Cropping; Terraces; Control of Gullies, of Wind Erosion, and of Wave Erosion; and Control of Floods.

- (248)
DUMPING SOIL INTO THE SEA. Farm and Fireside 35: 7, 9, illus. June 5, 1915.

The author states that Middle West farms lose 11 tons of earth a second through soil washing. He recommends cover crops to stop soil washing, filling ditches with straw for catching and holding soil run-off, planting black locust, and plowing around slopes.

- HAASIS, F. W. (249)
EROSION CONTROL WITH THE S. E. R. A. Soil Sci. 41: 231-238. March 1936.

The results of an erosion survey of one supervisorial district of Monterey County, Calif. "afford little basis for correlating erosion with soil, slope, or cover conditions, except that with timber or brush cover, erosion was inappreciable. On more than half of the farms surveyed, erosion was noted, serious erosion on one-fifth of them. On one-fourth, some sort of control was practiced by the owner. On one-seventh, land use had been reduced because of erosion. Ill-advised farm management is responsible for much of the erosion observed . . . The control measures included building of approximately 200 dams and other structures, largely of willow; planting willow and sea-fig; laying drain pipe; and digging diversion ditches." Accompanying figures show the Harris type dam in place and a brush stairway in a narrow, steep gully.

- HALE, G. A. (250)
THE BATTLE OF CROWLEY RIDGE. Prog. Farmer (Miss. Valley ed.) 51: 24. September 1936.

Tells of the "organized and effective arrest of the wasting away of the valuable soil" in northeast Arkansas by means of cooperative arrangements between the Soil Conservation Service and 65 farmers of the Crowley Ridge section.

- HALL, A. R. (251)
EARLY EROSION-CONTROL PRACTICES IN VIRGINIA. U. S. Dept. Agr. Misc. Pub. 256, 31 pp., illus. 1937.

The author gives a more or less chronological history of agricultural practices, soil erosion and its recognition by Virginia farmers, and their attempts to prevent erosion during colonial and early national times. Literature citations pages 27-31.

- (252)
THE PROBLEM OF SOIL EROSION IN ANTE-BELLUM VIRGINIA. Soil Conserv. 2: 239, 243, illus. April 1937.

The author relates some incidents of early agriculture in Virginia and refers to George Washington and Richard Parkinson, an Englishman, who said: "Upon the whole, America appears to me to be a most proper place for the use to which it was first appropriated, namely the reception of convicts." An account of early erosion-control practices is given.

- HAMILTON, A. P. P. (253)
SIWALIK EROSION. Indian Forester 62: 375-387. June 1936.

The author tells how mountains and forests act as agents for the supply and distribution of water. A brief discussion of the geology of the Siwalik range (foothills of the Himalayas) follows, dealing specifically with erosion in the Siwaliks of the Hoshiarpur district in the Punjab.

- HATCH, C. A. (254)
FEDERAL RECLAMATION. Reclam. Era 26: 133-135. June 1936.

Speaking from personal observation and actual experience, the writer urges the need for concerted reclamation. He asserts that "there has long

been a misconception and a misunderstanding of reclamation, its purposes, its ends, and its accomplishments." He points out the benefits of wholesale conservation of waters for the creation of irrigated areas, to which large numbers of citizens could return to the soil and farm. The reclamation program "is national in scope, character and effect." Address delivered before Rivers and Harbors Congress, Washington, D. C., April 27, 1936.

HAVILAND, P. H. (255)

SOIL EROSION. Rhodesia Agr. Jour. 31 (6) : 420-450, illus. June 1934.

This article presents considerable data on soil erosion. Beginning with a general description of the various types of erosion in Rhodesia and some recommendations for control, the author gives instructions for building storm drains and ridge terraces. Diagrams and tabular data are included. Gully control is also considered.

HENDRICKSON, B. H. (256)

SOIL EROSION EXPERIMENTS. Tex. Agr. Expt. Sta. Rept. 45: 124-128. 1932.

A summary of the results of a cooperative study of soil erosion by the United States Bureaus of Agricultural Engineering and Chemistry and Soils at Experiment Substation No. 2, Tyler, Tex. Phases of the subject treated are: Field crops, native vegetation, winter cover crops, upland pasture mixture, experimental rotation, and strip cropping.

—, AND BAIRD, R. W. (257)

OUTLINE OF INVESTIGATIONAL WORK IN PROGRAMS AND BRIEF SUMMARY OF PRINCIPAL RESULTS: 4-YEAR PERIOD, 1931-34. Soil Erosion Experiment No. 4, Tyler, Tex. SCS-EP-4, 23 pp. 1935.

This report, prepared in cooperation with agricultural experiment stations of Texas, Arkansas, and Louisiana, reviews the results of soils and crop studies, cropping types, organic and fertilizer treatments, strip cropping, strip cropping combined with terracing, contour tillage, erosion of different soil types, types of terraces, and check dams. Data are presented on erosion and run-off losses from controlled plots.

HIBBS, B. (258)

DUST BOWL. Country Gent. 106: 5-6, 83-87. illus. March 1936.

The author describes the geological epic of the Plains and relates his experiences during a visit to Baca County, Colo., after 10 years' absence. "In two brief generations man has undone nature's labors of several thousand years." He advocates the saving of pastures and reestablishment of grasslands by the Government or the States through the Soil Conservation Service.

HILL, C. READ. (259)

CORN SURPLUSES AND SOIL EROSION. The Land, Today and Tomorrow 1: 13-14. October 1934.

Briefly discusses corn cropping at the Bethany station. A table shows the relationship between low yields and total production.

HILL, E. B., AND TAYLOR, H. B. (260)

LAND USE AND SOIL CONSERVATION PRACTICES IN MECOSTA COUNTY. Mich. Agr. Expt. Sta. Quart. Bull. 19: 207-212. May 1937.

Information was obtained relative to soil conservation needs and practices on 78 farms in Wheatland and Sheridan Townships, Mecosta County, Mich., in 1936. "According to the 78 farmers visited in this study, 91 per cent of the land on their farms had not shown any signs of erosion. In most instances 'sheet erosion' is not noticed by the average farmer and not until gullies begin to appear does he consider his soil as being subject to erosion."

HOBLEY, C. W. (261)

SOIL EROSION: A PROBLEM IN HUMAN GEOGRAPHY. Geogr. Jour. [London] 82: 139-150, illus. August 1933.

The president of the Royal Geographical Society prefaced this lecture by saying: "Soil erosion . . . might have seemed a somewhat dull and very technical subject; but when one reads . . . that it is 'A problem in human geography' one realizes at once an interest, opened and widened to any extent that those concerned with the progress of the human race can imagine. That is what is at the bottom of the investigations which have been made into soil erosion." The author discusses soil washing in many lands caused

by deforestation and other bad land practices. Terracing on hillsides exposed to occasional torrential rainfall is one solution and has been in practice in southern Europe and southern England since the Iron Age. Reclamation processes are shown by diagrams.

HOFFMAN, M. H. (262)

SOIL EROSION IN IOWA. Amer. Soc. Agr. Engin. Trans. 13: 93-100. 1920.

"In presenting this paper we wish to state that no attempt has been made to gather minute data on slope, rainfall and drainage area. Our work in the prevention of soil erosion has been from the standpoint of an extension specialist who is anxious to fill existing ditches and keep others from forming . . . Nine out of every ten ditches in Iowa are caused by overfalls working back up through the land. In studying the problem it is well to consider the geological history of the state."

(263)

SOIL EROSION IN IOWA. Amer. Thresherman 23: 8-9, illus. January 1921.

"On the whole, Iowa is not badly eroded." Erosion caused by ditches and streams and the various methods for checking it by dams and tree planting are discussed. The use of sod strips and contour farming are considered.

HOLLAND, T. H. (264)

SOIL EROSION EXPERIMENTS ON THE EXPERIMENT STATION, PERADENIYA. Ceylon Dept. Agr. Yearbook 1926: 5-6, illus. 1926.

A recommendation of the estates products committee of the Board of Agriculture was "that further experiments should be carried out by the Department of Agriculture to determine, in Ceylon, the amount of erosion which is actually taking place in the principle planting districts." The scheme evolved and put in force is described.

HOPE, G. D. (265)

NOTE ON SOIL DENUDATION BY RAINFALL AND DRAINAGE. CONSERVATION OF SOIL MOISTURE. Trop. Agr. [Ceylon] 61: 149-153, illus. September 1923.

The conditions under which soil erosion takes place in the different tea districts of northeast India are described in detail. Terracing on sloping land, as seen in Java and Sumatra, and contour planting are recommended as measures for the prevention of serious erosion. Illustrations are given of the construction of terraces, and of a system of catch trenches to be used where the land is not steep enough to terrace.

HOPKINS, E. S. (266)

SOIL CONSERVATION PROGRAMS IN THE UNITED STATES AND CANADA. Sci. Agr. 17: 265-269. January 1937.

An outline of the soil conservation program developed in the Provinces of Manitoba, Saskatchewan, and Alberta, with a discussion of the general nature of the soil conservation program in the United States. Cooperative soil conservation projects at Bath, N. Y., Amarillo, Tex., and Colorado Springs, Colo., are considered.

HORNBY, A. J. W. (267)

DENUDATION AND SOIL EROSION IN NYASALAND. Nyasaland Dept. Agr. Bull. 11, 32 pp., illus. 1934.

"The local practice of native farmers in preparing forested areas or brush land for cropping by cutting and burning the natural cover is regarded as one of the most serious causes of the increased rate of erosion, both because of the extensive deforestation directly involved and because the short period (about 2 years) of productivity of land thus treated has resulted in the clearing and use of hill lands of which the slope is so sharp as to add still more to the erosion tendency. Part 1 of the bulletin discusses this and other causes of excessive erosion, and certain of its effects, under the heads of comparative effects of denudation and abnormal soil erosion in other countries, past and present state of Nyasaland—outstanding changes during the historical period, factors influencing the degree of erosion in Nyasaland, methods of native farmers in Nyasaland, alleviation of conditions due to erosion, and changes in climate with denudation. Part 2, on special measures and remedies, briefly considers the local practicability and effectiveness of such preventive means as storm-water drains, ridges on the contour, strip-cropping, ridge terraces,

bench terraces, cover crops, minor drainage systems, silt pits, use of stone walls and revetting, and dams at the headwaters of streams and in gullies."—Expt. Sta. Rec. 71: 603. 1934.

HORNBY, A. J. W.

(268)

EROSION OF ARABLE SOIL IN NYASALAND AND METHODS OF PREVENTION. Nyasaland Dept. Agr. Bull. 1 (pt. 3), 10-16. 1924.

The author discusses erosion of different types of soil in Nyasaland, stressing sheet-erosion damage. Control measures such as drains, silt pits, terraces, contour stone walls, contour hedges, cover crops, and green manuring are recommended.

HORNBY, H. E.

(269)

THE CONTROL OF ANIMAL DISEASES IN RELATION TO OVERSTOCKING AND SOIL EROSION. Empire Jour. Expt. Agr. 5: 143-154. April 1937.

In discussing soil erosion in Tanganyika Territory, the author maintains that the condition is due to the disturbance by man or his domestic animals of the vegetative cover which alone can prevent the shifting of soil by rain or wind, and that in countries with a long dry season overstocking is a dominant cause.

HOUSER, ZELMA L.

(270)

THE DEVASTATING TRAIL OF SOIL EROSION. Real Amer. 4: 32-35, 52, illus. December 1934.

The menace of soil erosion, which includes gullying, loss of topsoil, and soil washing caused by rainfall, is described and discussed. The need for reforestation, vegetative covering of all kinds, check dams, strip cropping, field terracing, and contour plowing is pointed out, and the work being done by the C. C. C. in the control of erosion is lauded. The writer draws a comparison between the United States and foreign countries, as Japan, the Union of Soviet Socialist Republics, Germany, and Argentina. "Other countries are making superhuman efforts to protect their resources. Let us refrain from going down the road which China travelled 2,000 years ago."

HOWARD, A.

(271)

SOIL DENUDATION BY RAINFALL AND DRAINAGE AND CONSERVATION OF SOIL MOISTURE. Indian Tea Assoc. Sci. Dept. Quart. Jour., pt. 1, pp. 24-30. 1914.

The author states that no effort has been made to treat the subject exhaustively. The whole of the cultivated area of India affected by the monsoon is subject to the loss of fine soil by rain wash. Terracing has been used successfully. The writer contends that "the enforcement of a regulation to terrace immediately all lands from which the forest canopy has been removed" would be beneficial in erosion control. "In the alluvium, the greatest source of loss of soil moisture . . . is undoubtedly the hard surface crust which forms after rain or after the application of irrigation water." The lever harrow is mentioned as the most efficient instrument so far found for breaking up surface crusts.

(272)

SOIL EROSION AND SURFACE DRAINAGE. Trop. Agr. [Ceylon] 61: 144-148. September 1923.

The writer attributes the continuous erosion of the soil in India chiefly to the uneven distribution of rainfall. "The general slope of the ground is another factor which influences the rate of erosion . . . The third factor on which the amount of erosion by rain-wash depends is the nature of the soil." Examples of erosion in various districts of India are discussed, and the writer urges "the enforcement of a regulation to terrace immediately all lands from which the forest canopy had been removed. I have heard that such a regulation is in force in Java."

(273)

SOIL EROSION AND SURFACE DRAINAGE. Pusa Agr. Research Inst. Bull. 53, 33 pp. 1916.

This article on soil erosion in India deals with the Pusa system of surface drainage, the development of drainage in Bihar, drainage maps and surface plans, the relation of waterlogging to soil erosion, methods of preventing erosion and waterlogging, and the utilization of embankments.

- HOWARD, I. M. (274)
 MAKING RAINDROPS BEHAVE. CONVERTS TO THE TEN COMMANDMENTS OF SOIL SAVING TELL HOW THEY CONQUERED SHEET AND GULLY EROSION. Successful Farming 35: 10-11, 38, 46, illus. May 1937.
 "On the Plum Creek Soil Conservation Service demonstration Erosion Control Project, with headquarters at Albion, Nebr., where work was started in the early spring of 1934, many farmers are in their third year, practicing cropping systems recommended for soil and moisture conservation. Strip cropping, contour farming, crop rotation, terracing, gully control—these and other soil and moisture-saving practices are producing results that are slowly revolutionizing farming methods." Various Nebraska farmers show how they were benefited by the inception of the project.
- HOWE, F. B., AND ADAMS, H. R. (275)
 SOIL EROSION IN NEW YORK. N. Y. Agr. Col. (Cornell) Ext. Bull. 347, 48 pp., illus. April 1936.
 Various types of man-made erosion resulting from farm cropping are discussed. Principles of erosion control through crop rotations, strip cropping, cover crops, reforestation, and correction of existing gullies are among the points considered. Land utilization in relation to erosion control is summarized. A reconnaissance erosion survey map of the State of New York is included.
- HOYT, K. K. (276)
 MANY ECONOMIC PROBLEMS INVOLVED IN PROPOSED CHANGES IN PUBLIC LAND POLICY; FUTURE OF LAND RECLAMATION WORK IS AN IMPORTANT PROBLEM—CONTROL OF EROSION INVOLVED IN THE AMOUNT OF GRAZING PERMITTED. Engin. News-Rec. 103: 427-429, illus. September 12, 1929.
 The author discusses President Hoover's proposal to cede the unreserved surface of the public domain to State control and regards Federal control as a main issue.
- HOYT, W. G. (277)
 EROSION AND WATERSHED PROTECTION. Civ. Engin. 4: 81-84, illus. February 1934.
 The watersheds of the country are divided into four general types according to their erosion characteristics. Changing conditions are outlined, and remedial measures being taken to provide stability are described in this article. "Assistance in the solution of the [erosion] problem can be rendered by the plant and forest ecologist, the soil technologist, the biologist, the geologist, and the engineer."
- HUTCHINSON, C. B. (278)
 NEW FACTS FOR CALIFORNIA FARMERS. Calif. Agr. Expt. Sta. Bien. Rept. 1933-34, 151 pp.
 A discussion of the soil-erosion problem in California and results of research toward its solution are given, pages 16-18.
- HUTTON, J. G. (279)
 REPORT OF THE SOIL CONSERVATION COMMITTEE. Amer. Soil Surv. Assoc. Bull. 17: 174-175. 1936.
 Outlines activities of members of the committee, the work of the Soil Conservation Service, and suggestions by members for future work.
- HYDE, ARTHUR M. (280)
 COST AND CURE OF EROSION. Kans. State Bd. Agr. Bien. Rept. 28: 147-155, illus. 1932. [Article by same title in Amer. Forests 38: 435-438, illus. August 1932.]
 An address delivered before the American Forestry Association, Baltimore, Md. Some national aspects of the soil-erosion problem are considered. "The severity of erosion . . . varies with the region. On the Piedmont plateau, some 51,000,000 acres in extent, about 2,600,000 acres once in cultivation have been rendered agriculturally useless by gullying . . . In the Appalachian mountain area, which totals about 78,000,000 acres, between ten and fifteen million acres have been seriously eroded . . ." Figures on erosion are given for the southern brown-loam region, the rich black belt of Texas, Alabama, and Mississippi, and the north-central section

of Wisconsin and Minnesota. The causes of erosion are outlined and a list of "additional consequences" is given. The author advocates a sound national policy of land utilization as a control measure and stresses the importance of the individual cooperation of the farmer.

HYDE, ARTHUR M.

(281)

SOIL EROSION. U. S. Dept. Agr. Yearbooks 1930: 44-46. 1930; 1933: 59-63. 1933.

The first article discusses some of the causes of soil erosion, recommends several control measures and outlines the soil-erosion program for 1930. In the second article the annual losses from soil erosion and the new soil-erosion program are discussed. Erosion conditions in the Corn Belt are considered briefly. Control methods are described. The author warns that only a sound national policy of land utilization of which erosion control is a vital part will afford a satisfactory solution to the problem.

ICKES, HAROLD L.

(282)

THE NEW DEAL IN CONSERVATION. U. S. Dept. Int. 15 pp. 1934. [Mimeographed.]

An address before the seventieth annual midwinter meeting, Chicago Dental Society, February 26, 1934. The Secretary states that erosion is rapidly building an empire of worn-out land in the United States, and attributes the cause mainly to forest denudation and indiscriminate removal of vegetation. Overgrazing, especially in the West and Southwest is also cited as a causal factor. The development of natural resources is recommended as a basic control measure, and the objectives of two new Government bureaus in conservation, the Public Works Administration and the Soil Erosion Service, are outlined.

(283)

SAVING THE GOOD EARTH. Survey Graphic 23: 53-59, 91-93, illus. February 1934.

The Mississippi Valley committee and its plan are considered in this article, which is but a "glimpse of what such a committee might, and it is hoped, will accomplish . . . It is not a blueprint but a chalk sketch that is submitted here." One Mississippi Valley farm described has been ruined for lack of adequate water. The writer tells how the committee will function, and outlines its plan for conserving water and soil, reforestation, flood control, agriculture, navigation, and power.

(284)

THE SOIL EROSION SERVICE. Sec. Interior Ann. Rept., 1934: 353-363, illus. 1934.

The objectives of the Soil Erosion Service are given, followed by a general discussion of the soil-erosion problem. Data on the accomplishments of the Service up to June 30, 1934, are presented in tabular form.

IMPERIAL BUREAU OF SOIL SCIENCE.

(285)

SOIL EROSION. Imp. Bur. Soil Sci. (Rothamsted Expt. Sta.) Tech. Commun. 5: 1-13. December 1929.

The South African Drought Investigation Commission is quoted as reporting that "the true cause of erosion was the reduction of the vegetative cover of the soil, brought about by deforestation, overgrazing, and burning." A quantitative study of the problem is made with regard to rainfall, slope of land, nature of the soil, the vegetation and agricultural system, and overstocking. Experiments were carried out in the Malay States, China, the United States, and Ceylon. Preventive measures are presented and discussed such as terracing and drainage, and examples given from Java, Ceylon, and India.

INTERNATIONAL CONGRESS OF SOIL SCIENCE.

(286)

TRANSACTIONS OF THE THIRD INTERNATIONAL CONGRESS OF SOIL SCIENCE, OXFORD, ENGLAND, 1935. 3v. London. Thomas Murby & Co. 1935-36.

Papers in Volume 1 relating to soil erosion are: Soil Drifting in Canada, by E. S. Hopkins, pp. 403-405; and Measurements of Erosion by Water, Using Electrical Methods, by E. G. Richardson, pp. 405-407.

Volume 2 includes a paper entitled "Soil Erosion and its Control in the United States", by W. C. Lowdermilk, pp. 181-194. The author reviews, in

a broad way, man-induced erosion and its control in the United States. The history of erosion, erosion conditions by classes, and the program of the Soil Conservation Service are outlined.

Volume 3 includes a paper entitled "Some Aspects of Soil Erosion Control in the U. S. A.", by Helmut Kohnke and J. S. Cutter, pp. 177-180. In it factors influencing the degree of erosion and methods of erosion control are discussed.

IOWA STATE BOARD OF CONSERVATION. (287)

REPORT ON THE IOWA TWENTY-FIVE YEAR CONSERVATION PLAN. 176 pp., illus. Des Moines, Wallace-Homestead Co. 1933.

Chapter V, The Conservation of Iowa's Soil (Soil Waste and Erosion, Importance of Erosion Control, Measures for Erosion Control, Administration of Erosion Control); chapter VI, The Conservation of Iowa's Waters (Underground and Surface Waters, Conservation Problems and Measures); chapters VII and VIII, Woodland and Wild Life Conservation in Iowa. Cartoons by J. N. (Ding) Darling are included. Bibliography pages 175-176.

IOWA STATE PLANNING BOARD. (288)

A REPORT ON WATER USE AND CONSERVATION IN THE DES MOINES, SKUNK, AND SOUTHEASTERN RIVER BASINS IN IOWA. Iowa State Planning Bd. Rept. 2, 120 pp., illus. August 1936. [Mimeographed.]

In this report soil erosion and surface pollution are considered, pages 66-67; silt removal, pages 78-79; bank erosion, pages 79-80; and soil conservation and reforestation, pages 92-93.

(289)

A REPORT ON WATER USE AND CONSERVATION IN THE IOWA-CEDAR RIVER BASIN. Iowa State Planning Bd. (Ames) Rept. 1, 104 pp. July 1936. [Mimeographed.]

In this report various phases of soil conservation and erosion are discussed, pages 80, 89, 103-104.

ISRAELSON, O. W. (290)

PLANNING FOR WATER CONSERVATION. Utah Farmer 57: 3, 10, 15. January 25, 1937.

"The major objective of planning for water conservation in Utah is to develop and maintain complete physical control and efficient beneficial use of all of the State's water resources."

JACKS, G. V. (291)

FLOOD AND SOIL. Spectator 2: 262-263. February 12, 1937.

"Men have dreamed of a posterity dominated by helicopters, hygienic clothing and beautiful cities of skyscrapers, but present indications are rather that the next, and perhaps the first really scientific civilization will be based on more prosaic things such as contour terraces, afforestation, dams and above all, the maintenance and improvement of grass. Throughout the world steps are at last being taken to meet the erosion menace."

JACKSON, D. H. (292)

OUR GREATEST NATIONAL WASTE, THE QUESTION OF SOIL EROSION. Ill. Jour. Com. 19: 3, 25, 27, 30, illus. January 1937.

A review of the generally recognized facts and conclusions drawn from discussions involving the question of soil erosion and its relation to floods.

JENKINS, HAL. (293)

26 FARMS WENT DOWN RIVER IN EIGHT DAYS. Ohio Farm Bur. News 15: 11, 28. February 1936.

A brief description is given of the Soil Conservation Service program in Ohio which includes a tree nursery directed from Zanesville to supply Federal operations in a five-State region. "The equivalent of 26 farms 100 acres in size having six inches of topsoil passed down the Muskingum River at Zanesville in eight days—a permanent loss of 2,600,000 tons." In discussing definite, practical methods of soil control the author says that the methods vary. "They are extremely simple . . . erosion control and proper land utilization can be achieved without depreciation of income."

JENNINGS, A. C.

(294)

SOIL WASHING. Rhodesia Agr. Jour. 18: 461-468, illus. October 1921.

This article on soil erosion in Rhodesia, discusses conditions in Mashonaland. The washing of cultivated lands and precautionary measures are described.

(295)

SOIL WASHING, OR THE SURFACE EROSION OF CULTIVATED LANDS. Rhodesia Agr. Jour. 20: 647-652, illus. December 1923.

Soil erosion in Rhodesia is described, and such control measures as storm-water drains, natural watercourses, bench terraces, contour belts of vegetation, and ridge terraces are suggested.

JOACHIM, A. W. R.

(296)

A NOTE ON THE EFFECT OF INDIGOFERA ENDECAPHYLLA ON THE NITROGEN AND ORGANIC MATTER CONTENTS AND THE MECHANICAL CONSTITUTION OF TEA SOILS AT PERADENIYA. Trop. Agr. [Ceylon] 74: 137-140. March 1930.

The writer comments on an experiment begun in 1925 on the prevention of soil erosion by the use of indigo in Ceylon. The results of the experiment are shown in tables and a summary.

JONES, B. W.

(297)

THE VALLEY OF LOST HOPE. Amer. Forests 40: 298-300, 318, illus. 1934.

The author describes the old Hamer family and estate in Mississippi showing photographs of the devastation of once fertile lands now known as the "valley of lost hope." Reconstruction of gullies through the use of black locust trees and honeysuckle vines and the various types of dams built by the C. C. C. are discussed.

JONES, EWING.

(298)

PAVING THE WAY TO SOIL CONSERVATION. Dairymen's Price Reporter 21: 6-7, illus. June 1937.

Outlines the history of soil erosion in Ohio and reviews the Federal soil defense campaign in that State from 1929 to the present time. "More than 77,000 acres of agricultural land in Ohio alone have been directly influenced by methods of erosion control . . ." Strip cropping, liming, fertilizing, and rotation are recommended; personal experiences of farmers are cited. A list of farmers who have had their cropping programs replanned for soil conservation is included.

JONES, L. A., SCHLICK, W. J., AND RAMSER, C. E.

(299)

A REPORT ON THE METHODS AND COST OF RECLAIMING THE OVERFLOWED LANDS ALONG THE BIG BLACK RIVER, MISSISSIPPI. U. S. Dept. Agr. Bull. 181, 39 pp., illus. 1915.

"The following report [the findings of a survey by drainage investigations, Office of Experiment Stations, United States Department of Agriculture] describes briefly the conditions found, discusses the drainage problems encountered, and presents the plan of drainage considered most practicable. It is believed that this information will be decidedly helpful to engineers, drainage district officials, residents, and owners of property in many localities where overflowed lands are to be reclaimed."

JONES, L. G.

(300)

SOIL CONSERVATION—A PERSONAL PROBLEM. Farm and Ranch 55: 9. August 1, 1936.

"It is common knowledge that a Nation survives no longer than its fertile acres." The author refers to the professor of soil of the Agricultural and Mechanical College of Texas who contends that soil conservation is "a personal problem, a social problem, and a National problem."

JOTTER, E. V.

(301)

SOIL EROSION CONTROL. Penn State Sylvan 1935: 8-10, 78. [State College, Pa.] 1936.

"Serious soil losses are now recognized as occurring on 75% of the farms of the country and the problems of control are national in scope . . . The deadly effects of sheet erosion are not fully recognized and understood . . . A necessary solution . . . in controlling erosion losses, is to

teach land owners how to apply corrective measures under systems of wise land use." The place of foresters in the soil conservation program is stressed.

- JOUBERT, M. J. (302)
PREVENTING AND COMBATING SOIL EROSION. *Farming in So. Africa* 5: 265-266, 271, illus. September 1930.

The author describes how existing soil erosion may be prevented from assuming dangerous proportions in the future. Seven points to be observed in the fight against soil erosion are set out in a final summary.

- KANSAS AGRICULTURAL EXPERIMENT STATION. (303)
SOIL CONSERVATION. *Kans. Agr. Expt. Sta. Bien. Rept.* 1931-32: 25-30. 1932.

"The problem of soil conservation has continued to receive careful consideration by the Agricultural Experiment Station during the past bienium. No problem is of greater fundamental importance." Data on these investigations are given in this report.

- KANSAS STATE PLANNING BOARD. (304)
RECOMMENDATIONS FOR THE IMPROVEMENT OF AGRICULTURAL CONDITIONS IN KANSAS. *Kans. State Planning Bd. Rept.*, 46 pp. November 1936. [Mimeographed.]

The necessity of coordination is stressed in this program dealing with land-use and water problems. Administration, credit, and taxation policies are outlined. "Demonstration work in soil conservation practices has recently been undertaken on a large scale by the Soil Conservation Service of the Department of Agriculture." It is recommended that these demonstration projects be continued, but a greater measure of decentralization should be achieved.

- KENTUCKY AGRICULTURAL EXPERIMENT STATION. (305)
REPORT OF THE DIRECTOR, 1936. *Ky. Agr. Expt. Sta., Ann. Rept.* 49, 63 pp. 1937.

Two activities relating to soil conservation are reported, pages 10-11. (1) From a number of farmers in the highly eroded Eden shale area of central Kentucky, information was obtained relative to length of rotation necessary to control erosion on the different types of soil; and cultural and engineering practices to control erosion on steep slopes. (2) In a study of Logan County made in cooperation with the Soil Conservation Service, the following is reported: "An analysis of the amount of erosion on 93 representative farms was made. The 15 farms showing the least erosion were compared with the 15 showing the most. A net loss of about one-third of the top soil had taken place in the former group, and about three-fourths in the latter. The least eroded averaged 30 acres more per farm than the most eroded. The least eroded farms averaged larger yields of crops; corn averaged 28 bushels per acre, wheat 3 bushels, and tobacco 349 pounds per acre more than on the badly eroded farms. Operators of the 15 least eroded farms earned labor incomes averaging \$536 more per farm than the 15 operators of the most eroded farms."

- KING, F. H. (306)
FARMERS OF FORTY CENTURIES, OR PERMANENT AGRICULTURE IN CHINA, KOREA, AND JAPAN. Ed. 3, 370 pp., illus. New York. Harcourt Brace & Co., Inc. [1911.]

Introductory comment: "The tilling of the earth is the bottom condition of civilization. If we are to assemble all the forces and agencies that make for the final conquest of the planet, we must assuredly know how it is that all the peoples in all places have met the problem of producing their sustenance out of the soil . . . This book on agriculture should have good effect in establishing understanding between the West and the East . . ." Utilization of wasteland, reforestation, garden terracing, fertilizing with canal mud, conservation of fertility, shallow cultivation, irrigation of rice, agricultural experiment stations, and farm machinery are a few of the many subjects covered.

KING, J. A.

(307)

THE PLACE AND FUNCTION OF LAND RECLAMATION IN THE AGRICULTURAL PROGRAM. Agr. Engin. 12: 333-337, illus. September 1931.

The author attempts to "give a panoramic view of what reclamation has already done for this nation, and of what still remains for us to do." He goes on to list four principal forms of land-reclamation problems in chronological order and discusses the various stages of land clearing during the last 100 years.

KIRKWOOD, W. P.

(308)

EROSION THE TERRIBLE. Northwest. Miller 181: 178-179, illus. January 16, 1935.

Statistics are presented which show annual damage by erosion in the United States. Soil conservation projects are listed. Terracing and strip cropping, as well as contour farming and gully control are described and illustrated. The work of the C. C. C. is mentioned, and the writer concludes by stating that erosion as a major menace to American agriculture is on its way out.

KNAPP, G. S.

(309)

KANSAS WATER CONSERVATION PROGRAM. Kans. State Bd. Agr. Rept. 54: 21-29. 1935.

Discusses, from the standpoint of climate and geology, the water resources of the State and the problems involved in their utilization and control. Considerable data are given on run-off on the Kaw, Neosho, Verdigris, and Marais des Cygnes Rivers.

KNAPPEN, THEODORE M.

(310)

THE MENACE OF EROSION. Mag. Wall Street 58: 27, illus. April 25, 1936.

The destruction of topsoil during the last 150 years is described "Virtually all the rest of the country's 600,000,000 acres of tillable land is in a process of slow devastation by wind or water." The American Bankers Association is quoted: "This is a problem not only for the farmers, but for every patriotic and far-seeing citizen of this richly endowed land." The progress of the work of the Soil Erosion Service is described.

KOTOK, E. I.

(311)

EROSION: A PROBLEM IN FORESTRY. Jour. Forestry 29: 193-198. February 1931.

The author discusses the necessity of maintaining a soil cover to check erosion, aside from its effect on water conservation. "On badly eroded land the forests will have the dual job of devising means to check erosion and starting a new forest." Reference is made to experimental determinations on the influence of soil cover upon run-off and erosion.

(312)

VEGETATIVE COVER, THE WATER CYCLE AND EROSION. Agr. Engin. 12: 112-113, illus. April 1931.

"Vast areas of forests, through fire and destructive logging, and an empire of range land in the public domain, subjected to the abuses of unregulated grazing, have had a continuing history of accelerated erosion . . . The first step towards a solution of the problem is to place these lands under control and management, and to check the abuses at their source, be they fire, destructive logging, or overgrazing. Then must follow a laborious process of reestablishing the best possible mantle of natural vegetation . . ." The proper management of watersheds in connection with engineering is stressed.

KOULICHKOV, S. N., and MUNNS, J.

(313)

[A REVIEW OF EROSION CONTROL: THE GULLIES, THEIR STABILIZING, AFFORESTATION, AND TERRACING, BY E. E. KERN, PROFESSOR OF MOSCOW COLLEGE OF FORESTRY, ED. 7. 1936.] Jour. Forestry 32: 889-891. November 1934.

"Professor E. E. Kern, well known Russian authority on erosion control, deals in this book with the very serious problem of gullies, especially in the steppes region. He mentions a great number of solutions to the erosion problem, including the damming of gullies, terracing, and forest planting." Discusses chapter 2 which deals with afforestation in the plain of the southern part of the Union of Soviet Socialist Republics.

KURON, H.

(314)

THE SIGNIFICANCE OF SOIL EROSION INVESTIGATION FOR GENERAL SOIL SCIENCE. *Soil Research* 5(3): 229-237. 1937. [Title in German, English, and French. Text in German. Summary in both German and English.]

Summary: "The present paper gives a brief review of the points of view from which quantitative investigations on soil erosion may have significance for general soil science. Such investigations are of interest chiefly in connection with problems relating to soil genesis, geochemistry, soil cartography, and soil assessment."

Literature cited pages 236-237.

L., H. M.

(315)

EROSION. *Internatl. Sugar. Jour.* 38: 50-52. February 1936.

Erosion in tropical regions and common practices for its control are discussed. "Much experience has been gained in the process of checking erosion and reclaiming ravine lands bordering the rivers of northern India." Frequent reference is made to an account by R. L. Pendleton of the effects of erosion in the Philippines.

(316)

NEGLECT OF SOIL CONSERVATION AND ITS CONSEQUENCES. *Internatl. Sugar Jour.* 38: 328-329. September 1936.

"Land cannot be exploited with impunity and development should pay due regard to the conservation of that basis of permanent agricultural prosperity—the soil." It is suggested that sugarcane growers may profit from a study of erosion control.

LACEY, J. J.

(317)

TWO BILLION DOLLAR ANNUAL LOSS. *Prairie Farmer* 106: 1, 22, illus. February 3, 1934.

"More fertility is washed away each year than we return to the soil in the form of fertilizers in 10 years . . . Many of our farms have lost the entire seven inches of top soil. It takes nature 400 years to form an inch of top soil . . ." Brush dams, wirebasket dams, brush and straw plowed in new gullies, steep hillsides planted to bluegrass, alfalfa, or trees, and terrace building are among control measures advocated.

LAKIN, H. D.

(318)

MICHIGAN COVERS UP. *Mich. Farmer*, pp. 5, 15. July 4, 1936.

"Michigan is taking a long step forward in the conservation of its basic natural resource, the soil. Recognized among leading states in agricultural development, it is not surprising to find within its borders a project designed to conserve the soil and control erosion."

LA MONT, T. E.

(319)

ACREAGE OF LAND CLASSES I AND II IN THE WATERSHED OF THE SUSQUEHANNA RIVER IN NEW YORK STATE AND ITS RELATION TO FLOOD CONTROL. *Cornell Agr. Ext. Farm Econ.* 96: 2351-2355. June 1936.

The advantages of reforesting land classes I and II are discussed. "At the Arnot Soil Conservation Experiment Station, in Schuyler County, extensive snow records show that more than a foot of snow remained in the woods after the peak of the disastrous floods in the spring of 1936, while the open fields were largely bare."

LEAVITT, S.

(320)

NATIONAL ASPECTS OF SOIL EROSION AND FLOODS AND THEIR CONTROL BY VEGETATIVE COVER. *Jour. Forestry* 30: 328-335. March 1932.

An exposition of the agricultural, industrial, and social losses that result from erosion and floods. Causes and their correction from a national viewpoint are discussed. The function and importance of engineering works is admitted, but the necessity of supplementing such works by "Nature's own methods of protection through a forest or other natural vegetative cover" is emphasized. Legislation for a more comprehensive national program of research is proposed.

LEE, R. E.

(321)

FIGHTING WIND AND WATER IN TEXAS. Farm and Ranch 55(24): 12-13. December 15, 1936.

Work of the National Youth Administration and the Soil Conservation Service in Texas is described. "The work will halt the increasing loss of crop-producing soil . . . All our young men and women must understand that conserving the soil and water supply of the land is most important to the future welfare of their country."

LEE, W. D.

(322)

FROST MUST SHARE THE BLAME. The Land, Today and Tomorrow 2: 12-14, illus. March 1935.

Describes the nature of frost erosion and suggests some methods of control.

LEHMAN, E. W.

(323)

SOIL THAT IS WASHED AWAY. Successful Farming 21: 11, 39, illus. February 1924.

Briefly discusses the extent of soil erosion in the Middle West. The causes of erosion are analyzed and described. Sheep's fescue is suggested as a valuable soil-binding grass.

LENTZ, G. H.

(324)

FROM FOREST TO WASTE LAND. Amer. Forests 37: 150-151, illus. March 1931.

Sheet erosion and gullyng have caused the abandonment of large plantations and cultivated areas. "A twenty-year cycle from forest to 'bad lands' presents a challenge to those interested in farm and forestry problems in the South. Is it worth trying to farm lands of this type? Would terracing be justified and on such lands would it be financially practicable? . . . These are questions the forester and the agricultural economist must answer." Various areas are described and illustrated.

(325)

SOIL EROSION IN WESTERN MISSISSIPPI. Okla. Sta. Cir. 79: 23-31. 1931.

A paper read at the second Southwest Soil and Water Conservation Conference. Gives a description of a study of erosion and erosion control in the lower Mississippi Valley by the Southern Forest Experiment Station of the United States Forest Service. A table on the percent of cleared land surface actively eroding for seven counties, and a bibliography on various phases of soil and water conservation in Mississippi are included.

— SINCLAIR, J. D., AND MEGINNIS, H. G.

(326)

SOIL EROSION IN THE SILT LOAM UPLANDS OF MISSISSIPPI. Jour. Forestry 28: 971-977. November 1930.

"Of various factors concerned in soil erosion and which are presumed to account for differences in the severity of erosion in different sections of the State are listed (1) differences in temperature, (2) variations in depth of the loess soil, (3) changes in underlying strata, (4) frequency of fires, and (5) past farm practices. Each of these is discussed in relation to the problem."—Expt. Sta. Rec. 64: 17. 1931.

LEOPOLD, ALDO.

(327)

CONSERVATIONIST IN MEXICO. Amer. Forests 43: 118-120, 146, illus. March 1937.

The writer contrasts our southwestern mountains, badly gutted by erosion, with the Sierra Madre Range across the line in Mexico, which still retains the virgin stability of its soils. The author believes that "the Sierra Madre offers us the chance to describe and define in actual ecological measurements, the lineaments and physiology of an unspoiled mountain landscape."

(328)

COON VALLEY. AN ADVENTURE IN COOPERATIVE CONSERVATION. Amer. Forests 41: 205-208, illus. May 1935.

"Coon Valley [Wis.] is one of the thousand farm communities which, through the abuse of its originally rich soil, has created the Mississippi flood problem, the navigation problem, the overproduction problem, and the

problem of its own future continuity." Describes the work in the Coon Valley erosion project, including the repair of eroding gullies, reforestation, wildlife preservation, and other constructive conservation measures.

- LEOPOLD, ALDO. (329)
PIONEERS AND GULLIES. *Sunset Mag.* 52: 15-16, 91-92, illus. May 1924.

Soil-erosion control is better than trying to develop new land, especially by irrigation in the Southwest. Preservation is cheaper than cure. Various measures for erosion control within the farmers' means, are cited, among them inexpensive dams for the prevention of soil washing and gully-ing. Public control of land, reformation of the conditions of land tenure, and Government inspection of land to insure soil- and water-conservation measures are advocated.

- LEPPAN, H. D. (330)
THE INTERDEPENDENCE OF ANIMALS, CROPS AND PASTURE, WITH SPECIAL REFERENCE TO SOUTH AFRICAN FARMING. Univ. Pretoria, Pub. Ser. 1, Agr. 37, 21 pp. 1936.

The author discusses the relation of the soil-plant-animal cycle to soil erosion and suggests that farming with fewer animals but of better quality would restore the balance which has been upset in the past. Chapter headings are: South African pastures; The Husbandry of Animals in South Africa; and The Cultivation of South African Crops.

- LINDENBERGER, E. F. (331)
WASHING DOWN HILLS TO MAKE NEW LAND. *Sci. and Invent.* 19: 293, illus. August 1931.

The owner of 1,000 acres of orange and grapefruit groves on the western slope of San Bernardino Mountains, developed the method of leveling land to reclaim otherwise worthless land. The hillsides were gashed with great gullies, but he developed a system for filling canyons and building up the soil. This system is described and illustrated.

- LIPMAN, J. G. (332)
CONSERVATION OF OUR LAND RESOURCES. *Science* 83: 65-69. January 24, 1936.

"The conquest of the wilderness and the building of homes represent one page of our national record. The opposite page tells another story; one of land exploitation, soil wastage, agricultural decadence in many places and of people wandering back and forth." Problems of land conservation, plans and programs of land use, and the protection of the soil and its resources are discussed by the author, who concludes: "Our strength lies in the soil; our hope, in the land; our salvation in the upward climb toward the higher peaks of economic and social justice."

- (333)
WHY SAVE THE SOIL? *N. J. Farm and Gard.* 7: 5, 14. February 1936.

"We are thinking of soil conservation as a promising approach to dealing with various economic and social questions. If soil conservation fits into the present-day pattern of national programs and policies let us have it by all means. But there is something bigger, something more vital and compelling in soil conservation—it is a sacred duty, a part of the human tides that shall flow hither and yonder."

- LIVINGSTON, L. F. (334)
BLASTING TAP-ROOTED STUMPS IN THE SOUTH PLAYS PART IN CCC SOIL EROSION PROJECTS. *Agr. News Letter* 3: 16-17. June 1935.

The writer describes methods of blasting stumps as used in the C. C. C. "In general, it can be said that green stumps require 3 times more explosives than partly rotted ones . . . Less dynamite is required when the soil is moist."

- LODGE, J. E. (335)
NEW FEDERAL SERVICE TO END DESTRUCTION OF OUR FARMS. *Pop. Sci. Monthly* 124: 38-39, illus. January 1934.

The Soil Erosion Service program is summarized and analyzed. Various experiments for prevention of soil erosion are cited. Strip cropping, terrace building, and gully treatment are emphasized for soil conservation.

LORD, RUSSELL.

(336)

WHEN THE LAND COMES TUMBLING DOWN. *Country Home* 60: 62, 63, illus. March 1936.

The despoliation of the Rocky Mountain Ayer Ranch by flood waters is traced to timber slaughter and overgrazing, together with crop booms that pushed plowed land up to the timber line. Contour furrows, broad-base terraces, willow planting, and restoration of trees and grass are among the measures employed in reclaiming the land.

LOWDEN, F. O.

(337)

THE DARKER SIDE OF THE PICTURE. In Beard, Chas. A., ed., *A Century of Progress*, pp. 142-145. New York, Harper & Bros. 1933.

The disturbing progress of soil depletion is discussed briefly. "For the future we shall have to depend, as older nations do, not upon new lands to be opened up but upon the maintenance of fertility upon the lands already under cultivation."

(338)

OUR COMMON BROWN DIRT BECOMES CENTER AND CIRCUMFERENCE OF THE NEW NATIONAL FARM POLICY. *Breeder's Gaz.* 101: 5, illus. March 1936.

Discussion of sheet erosion and its ravages. The author comments on the work of the Missouri Agricultural Experiment Station and recommends the planting of legumes.

LOWDERMILK, W. C.

(339)

ACCELERATED EROSION: ITS EFFECTS ON SOIL AND WATER RESOURCES. *Sci. Monthly* 41: 19-28, illus. July 1935.

The writer traces the course of man-made soil erosion from pioneer days to present times. "Accelerated erosion has combined with an acceleration of superficial run-off from bare slopes to accentuate flood peaks and to augment the cutting power of the stream flow. Still more significant is the transformation of fertile soils into troublesome silt and sediments. . . . Particularly significant and important is the rapid rate of silting which is going on in reservoirs located on streams within critically eroding areas of the country. This applies to the East as well as to the West." Gully and sheet erosion in various areas is illustrated, and in his summary, the writer outlines a project for considering the processes of erosion in each region so that a program of development may be forecast "whereby not only will sustained productivity of soils be assured, but erratic flood flows will be minimized or reduced and beneficial power and utilization of the water of the country preserved in the highest degree."

(340)

CIVILIZATION AND SOIL EROSION. *Jour. Forestry* 33: 554-560. June 1935.

"Not until recent years, beginning with George Marsh, has an inquiry been made as to the part that mismanagement of soil has played in the decline or the destruction of a civilization, and the inter-relation between civilization and erosion. As the civilizations increased in population the crop demands upon the surrounding lands became greater." The author stresses the need of the United States to stop the present destructive exploitation of natural resources and to launch a coordinated land-planning program for conservation. The physical crisis and principles of safe land use and types and processes of erosion are pointed out. Four basic principles of land usage are presented.

(341)

EROSION CONTROL IN JAPAN. *Assoc. Chinese and Amer. Engin.* 8: 3-13, illus. March 1927.

Examples of serious erosion have demonstrated to the Japanese the dangers of denuded slopes. A description is given of the damage done by a typhoon in 1911 in the region about Mount Asama, an active volcano. The forest act of 1897 was put into effect, and forest engineers were directed to check and control the erosion which had made such headway. After 10 years of work the headwaters of the Kirizumi River had been reclothed with vegetation and erosion processes brought under control. Contour terraces and various types of check dams were established. "The maintenance of watersheds in a mantle of forest vegetation has proved to be the

most economical policy in the control of flood waters, and necessary to permanency of food production in the valleys. Dikes are built in the alluvial plains to protect adjoining fields from inundation and submergence with sands." Hydraulic power is dependent upon a mantle of vegetation, and forest laws in Japan provide for the setting aside of protection forests for the purpose of preventing soil denudation and sand shifting, protection against floods, wind, and tide, prevention of avalanches and rolling stones, insuring a constant source of water supply, and affording shelters for fish, etc. "Erosion control is considered a necessity by the Japanese people regardless of its cost. . . . It must be stopped or controlled."

LOWDERMILK, W. C. (342)

EROSION IN THE ORIENT AS RELATED TO SOIL CONSERVATION IN AMERICA. Jour. Amer. Soc. Agron. 21: 404-414. April 1929.

In a comparative study of erosion processes in China, Chosen, Japan, and the United States, the author discusses the accelerated erosion of soils by agricultural occupation of the land. In the Orient experience teaches that "accelerated erosional processes are like a malignant disease, and that it is imperative that erosional processes should be held to their geologic norms by constructive soil management to save enormous losses in land values and production, and costs of erosion-control works."

(343)

FOREST AND AGRICULTURAL INFLUENCES IN STREAMFLOW AND EROSION CONTROL. SUMMARY REVIEW OF LITERATURE UP TO 1930. 37 pp. 1936. [Mimeographed.]

"The purpose of this summary review of literature is to set forth briefly the status of the conclusions of investigators who have studied the problem and of the experimental information on the subject as is found in European and American literature. . . ."

(344)

IMPRESSIONS OF THE THIRD INTERNATIONAL SOIL SCIENCE CONGRESS. Soil Conserv. 1:1, 15. September 1935.

As an official delegate of the United States to the International Congress of Soil Science, Lowdermilk describes the general purposes of the Congress and comments on studies of soil-plant relationships, and soil-erosion investigations. "It is impossible to notice within the limits of these impressions all important contributions made to pedology at the Congress. . . . The proceedings may be consulted with profit to specialists in the various fields of soil science."

(345)

MAN-MADE DESERTS. U. S. Soil Conserv. Serv. SCS-MP-4, 8 pp. 1936. [Mimeographed.]

In discussing the ravages of soil erosion in various parts of the world, the author attributes the causes to removal of vegetation and forest denudation, overgrazing, and the general lack of coordinated control. Erosion in the United States is described as having greater acceleration than in other countries. An article with the same title appears in Pacific Affairs 8: 409-419. 1935.

(346)

SAND RIVERS OF CHINA. Soil Conserv. 3: 1-3, 26-27, illus. July 1937.

The author gives an historic account of natural influences which have changed the course of certain rivers in China and also relates the tendency of Chinese agriculture to cause soil erosion. He limits his observations and erosion-control recommendations to the Hwai watershed, an area of 52,000 square miles.

(347)

SOIL EROSION AND ITS CONTROL IN THE U. S. U. S. Soil Conserv. SCS-MP-3, 12 pp., illus. November 1, 1935. [Mimeographed.]

Discusses conditions on the American continent during early colonial days and makes comparisons with the present condition of the land after three centuries of agricultural exploitation. Control measures being taken by the Government are reviewed.

LOWDERMILK, W. C.

(348)

SOIL EROSION AND ITS CONTROL IN THE UNITED STATES. 3d Internatl. Cong. Soil Sci., Oxford, England, Trans. 2: 181-194, illus. 1935.

"It is my purpose in this paper to examine in a broad way the problem of soil erosion or man-induced erosion and its control in the United States. The subject falls naturally into three parts: (1) A review of the conditions of the American continent when the English colonists cleared their first cornfields; (2) the present condition of the land after three centuries of agricultural exploitation; and (3), measures that are being taken to meet the menace and challenge of soil erosion to the people of the United States." Tables are presented to show comparison of erosion and run-off from 12 widely separated important soil types, and a summary of erosion conditions by classes in the United States.

(349)

SOME ASPECTS OF RESEARCH IN THE SOIL CONSERVATION SERVICE. Soil Conserv. 1: 1-7, illus. December 1935.

"Research by the Soil Conservation Service in erosion and its control is authorized by the Soil Conservation Act (Public, No. 46, 74th Cong.), and by the Secretary of Agriculture's memorandum of March 27, 1935 . . . the work of the division has been broken down into five major phases to facilitate direction and supervision and to secure the best results from the special training and capacities of the research staff. These phases are the following: 1. Climatic and physiographic studies; 2. Erosion control investigations; 3. Sedimentation and hydraulic investigations; 4. Watershed and hydrologic studies; 5. Economics of erosion and its control, cooperating with Bureau of Agricultural Economics."

— and SMITH, J. R.

(350)

NOTES ON THE PROBLEM OF FIELD EROSION. Geogr. Rev. 17: 226-235, illus. April 1927.

This article deals with erosion in Shansi, China. A study of the destructive processes at work in the region of the headwaters of the Fen River was made. The waste of timber, soil washing on denuded slopes, deforestation, and other soil-destructive measures are described, with many illustrations. The world problem of checking field erosion is discussed. Comparisons are made of terracing operations in China with those of Europe and the United States. The authors contend that a whole new type of agriculture is needed—"one that can live on hills and let the hills live," in China as well as in the United States.

LOWE, E. N.

(351)

REFORESTATION, SOIL EROSION AND FLOOD CONTROL IN THE YAZOO DRAINAGE BASIN. South. Forestry Cong. Proc. 4: 10-11. 1922. [Also in Lumber World Review 42: 39-53. February 25, 1922.]

The author quotes Professor Shaler on denuded forests: "An hour's torrential rain may wash off to the sea more than would pass off in a thousand years in the slow process of erosion which the natural state of the earth permits." Application is made to conditions in Mississippi. "The erosion of these uplands has resulted not only in enormous losses of valuable agricultural soils, but also in concomitant streamfilling throughout those areas . . . In the more broken areas forests or other protective growth will be necessary, and in the less broken parts seeding the soil with Bermuda grass and other forage plants may be used effectively." The remedy for chasms is seeding of the bottoms in black locust and honeysuckle, the author contends.

(352)

SOIL EROSION: A PRELIMINARY STUDY OF SOILS OF MISSISSIPPI. Miss. Geol. Survey Bull. 8 (Ap. A): 195-205. 1911.

Soil erosion has disfigured much of the surface of the State of Mississippi. "This loss of the soil is only the first step in a seriously dangerous process . . . The heavy rains that fall frequently in our climate soon furrow the slopes; if the slopes are steep the furrows quickly become gullies . . . If the soil be sandy . . . the destruction is all the more rapid." The areas in the State where erosion is most active are outlined, and the resulting damage

discussed. "Nature has furnished us several remedies which with a little exercise of man's intelligence and energy may become operative." Old field pine and black locust for reafforestation with other trees and grasses for soil building and holding are described. Brush and log dams for the control of soil washing are advocated.

LYLE, S. P. (353)

THE SOIL EROSION PROBLEM IN THE NORTH ATLANTIC STATES. North Atlantic Sec. Amer. Soc. Agr. Engin., 6 pp., illus. January 17, 1934. [Mimeographed.]

A general discussion of soil erosion from New England to North Carolina. Describes the work of State extension services in the regions affected and outlines various control methods.

M., C. (354)

85 YEARS OF SOIL CONSERVATION. *Prairie Farmer* 108: 5, 14, illus. July 18, 1936.

Describes soil conservation and land-management methods as practiced on the farm of Elmo Franklin of McLean County, Ill., since 1851. Describes in particular a fine bluegrass permanent pasture: "Bluegrass almost knee deep grows right up to the trunks of the many huge picturesque maple, oak and hickory trees."

McCALL, A. G. (355)

RESTORING A WASTED HERITAGE. *Kans. State Bd. Agr. Quart. Rept.* 49 (193A): 22-29. 1930.

An address delivered at the Kansas Agricultural Convention in 1930. The author discusses the ravages of soil erosion in the United States and particularly stresses the problem in the West and the Southwest. The past work of various Federal bureaus, working on a cooperative basis, is described, and a general outline of a provisional soil-erosion program is given.

(356)

THE SOIL CONSERVATION RESEARCH PROGRAM FOR THE SOUTHWEST. *Okla. Agr. Expt. Sta. Cir.* 79: 11-15. 1931.

A paper read at the second Southwest Soil and Water Conservation Conference. Discusses the findings of the soil-erosion survey of Oklahoma, describes the work and problems of the experiment stations of the Southwest, and comments on the program of the Federal Government.

McDERMID, JEFF. (357)

RICHER DIET. *Better Crops and Plant Food* 20: 3-5, 44-46, illus. March 1936.

A plea for efficiency in agricultural practices to save the soil. "Erosion is wrong, wasteful, hateful, ugly, and a dirty discredit to us."

McGEE, W. J. (358)

THE CONSERVATION OF OUR SOILS. *Natl. Irrig. Cong. Ann. Sess.* 15: 80-85. September 1907.

"The waterways of the United States are annually gathering from the lands and pouring into the seas an aggregate of at least one billion tons of earth-matter . . . The effects of this enormous transportation are various—and all of them evil. Of the material transported . . . fully 90% is . . . mud and silt with earth salt, humus, acids, and other matter held in solution." Terracing and contour cultivation are advocated to remedy and check these losses, especially in the California Valley.

[MacLEISH, A.] (359)

GRASSLANDS. *Fortune* 2: 59-67, illus. November 1935. [Condensed in *Conservation* 1: 5. December 1935.]

This article is in three parts: The Frontier; The Broken Sod; Men Against Dust: The author regards the grasslands as the key to life on the 2,000,000,000 acres of this continent and reasons that dust storms are warnings that man has abused his planet past its powers of resistance and that government, science, and the common citizen must now unite to save it.

MACLEOD, W. C.

(360)

CONSERVATION AMONG PRIMITIVE HUNTING PEOPLES. *Sci. Monthly* 43: 562-566. December 1936.

Data as to the conservation practices of primitive nonagricultural peoples of the world, but more especially of American Indians, are given.

MCMILLEN, W.

(361)

FARM ENEMY NUMBER ONE. *Country Home* 58: 8-9, 38-41. January 1934.

A description of Providence Cave, Ga., and its rapid creation through erosion. "Soil erosion is the thief that steals away the source of all farm wealth." The erosion processes that took place on farms in Missouri, Ohio, and Virginia are described. Various measures for prevention and reclamation are discussed.

McPHERTERS, W. H.

(362)

SOIL EROSION AS A RESEARCH PROBLEM. *Agr. Engin.* 5: 158-160. July 1924.

"In a contribution from the Oklahoma College an analysis is given of the research features involved in a study of soil erosion. It is concluded that the phases of soil erosion requiring research treatment are the value of humus in soil in retarding soil erosion, the proper grading of terraces for different soils and land slopes, the comparative efficiencies of variable and constant terrace grades, the fall between terraces for different slopes, the amount of soil removed per unit for rainfall on various soil types and land slopes, and the value of terracing on the conservation of moisture."—*Expt. Sta. Rec.* 52: 386. 1925.

MADDOX, R. S.

(363)

FORESTS, GULLIES, AND RECONSTRUCTION. *Resources of Tenn.* 9: 23-31, illus. January 1919.

Stresses the importance of reforestation in erosion control, describes the nature and origin of gullies, and gives practical data on the reclamation of eroded lands. The planting of black locust, Bermuda grass, and honeysuckle vines are especially recommended.

(364)

PROBLEM OF EROSION. *Amer. Forestry* 23: 724-726, illus. December 1917.

"On the debit side of our nation's account are being written down in nature's book huge losses not only from our forests, but also from our tilled land." Particular attention is given the subject of reforestation of gulches and gorges. "It is practically if not wholly impossible for such large gulches to be held in check by forests at their heads. If some of the trees growing in these gulches were used in making temporary dams, then some permanent growth could be set out on the dirt caught by them in order to constitute a permanent dam." Black locust, Bermuda grass, and honeysuckle vines are recommended for this purpose.

(365)

RECLAMATION OF WASTE LANDS. *Tenn. Div. Forestry Cir.* 10, 10 pp., illus. October 1926.

Controlling erosion by covering a part of the gullied lands and eroded, rocky, shallow soils with locust is strongly impressed. Instructions for building brush dams, plowing off banks, cultivating, and planting are given.

MAITS, C. B., JR.

(366)

THE COASTAL PLAINS TACKLE EROSION. *Market Growers Jour.* 60: 62-63, 66-67, illus. February 1, 1937.

As the horse disappeared, the manure supply so necessary to the New Jersey truck farms failed, and erosion began. Now New Jersey farmers "must use erosion control measures to keep their soil on their farms . . . instead of letting it wash into already clogged streams." There are three Soil Conservation Service demonstration areas in New Jersey where farmers are shown the various methods for erosion control, of which terracing is the most important.

- MARKEY, MORRIS. (367)
NATURE AND THE FARMER. Sat. Evening Post 207: 5-7, 81-83, illus. July 21, 1934.

This article was written in a small town in South Dakota where it had not rained for 11 months. The drought and its results are described, and the historical background of the Dakotas is outlined. "During the ten years that followed the war, wheat farmers in the humid belt sensibly reduced their acreage by 31 per cent. Farmers in the arid Northwest increased their acreage by 73 per cent. They put the tractor into lands that were never good for anything but grazing . . . and planted their wheat." They also drained the region so thoroughly that tons of water annually were removed from land that had barely enough water to support plant growth.

- MARSH, G. P. (368)
THE EARTH AS MODIFIED BY HUMAN ACTION. 629 pp. New York, Scribner & Sons. 1898.

"The object of the present volume is: to indicate the character and, approximately, the extent of the changes produced by human action in the physical conditions of the globe we inhabit; to point out the dangers of imprudence and the necessity of caution in all operations which, on a large scale, interfere with the spontaneous arrangements of the organic or the inorganic world; to suggest the possibility and the importance of the restoration of disturbed harmonies and the material improvement of waste and exhausted regions; . . ." The influence of forests, floods, reclamation of lands, sands, and sand dunes are all treated in detail. The concluding chapter is Great Projects of Physical Change Accomplished or Proposed by Man.

- MARTIN, W. S. (369)
SOIL EROSION. Uganda Dept. Agr. Cir. 21: 14-16. 1929.

This circular briefly outlines the causes of soil erosion in the Uganda Protectorate and recommends as control measures (1) The use of lime which is said to have the effect of making a soil granular, cementing the smaller particles together, thus making soil washing less easy, (2) contour plowing, (3) contour drains, (4) cover crops, (5) hedge crops along contours, and (6), most important of all, terracing.

- MEERTEN, E. J. VAN. (370)
DONGA AND SHEET EROSION. Farming in So. Africa 6: 65-67. May 1931.

"Significant figures showing the actual depth of soil by erosion are given by W. M. F. Miller in his Report to the Ninth Annual Meeting of the American Soil Survey Association, 1929, being data collected after ten years of experiment at the Missouri (U. S. A.) Experiment Station . . . The remarkable feature in the above results is the effectiveness of rotation and of continuous sod as a preventive to erosion."

- [MILLER, DALE.] (371)
CAN WE DO ANYTHING ABOUT THE WEATHER? Tex. Weekly 13: 4-5. February 6, 1937.

Droughts and floods probably cannot be prevented, but their severity can be mitigated by conservation and reforestation programs. Individual and community efforts to promote conservation and reforestation should be encouraged. "The Panhandle Water Conservation Association was recently organized, with every precinct in virtually every county in that section represented." Its aims are to promote conservation programs to prevent floods in small areas and thus mitigate the severity of floods on larger areas.

- MILLER, M. F. (372)
THE BROADER ASPECTS OF SOIL CONSERVATION. Amer. Soil Survey Assoc. Bull. 17: 146-149. 1936.

The sociological point of view is discussed.

- (373)
EROSION AS A FACTOR IN SOIL DETERIORATION. Science 73: 79-83. January 23, 1931.

"Erosion is of importance in determining the character of both virgin and cultivated soils, and as a consequence it has a great significance to

agriculture." All types of erosion and the resultant rate of deterioration of agricultural lands are discussed. Studies made at the Missouri, North Carolina, and Texas Agricultural Experiment Stations are described and data given as to erosion losses in plant nutrients and soil. The relation of climate and of systems of farming to erosion losses are dealt with by the author, who concludes: "It is the duty of the Federal and State agencies dealing with agriculture to give special consideration to the erosion losses that are taking place and to encourage the general adoption of practical measures of control."

MILLER, M. F.

(374)

THERE CAN BE TOO LITTLE EROSION. Okla. Sta. Cir. 79: 32-35. 1931.

A paper read at the second Southwest Soil and Water Conservation Conference. Discusses various phases of the soil-erosion problem in Missouri and describes the work of the experiment station at Columbia, Mo. Contains three tables of soil erosion data furnished by the station.

(375)

WASTE THROUGH SOIL EROSION. Jour. Amer. Soc. Agron. 18: 153-160. February 1926.

The author describes the work of the Missouri Agricultural Experiment Station with regard to measuring erosion losses since 1917. Erosion and soil age, wind influence, as well as water influence, rotational crops, and loss of plant nutrients through soil erosion are all discussed. The author concludes that "most of this loss is due to mismanagement. The farmer has it within his power to control the situation if he will."

MINNESOTA CONSERVATION COMMISSION.

(376)

FIRST BIENNIAL REPORT, 1931-32. Minn. Conserv. Comm., St. Paul. 58 pp. 1933.

On pages 48-49, results of the Lake Forest Experiment Station investigations of soil erosion in Wisconsin and Minnesota are given. "The control of soil erosion, in its public implications, is not unlike the control of forest fires. It is as fully destructive of soil and water resources, fish, and other aquatic life, as fire is destructive of timber and game." The need of a State organization, giving systematic attention to this problem is stressed.

MINNICH, F. C.

(377)

GEO. WASHINGTON'S FAVORITE VOCATION. FIRST PRESIDENT WAS ALSO AMERICA'S "FIRST FARMER." Ohio Farmer 179: 95, illus. February 13, 1937.

George Washington is referred to as a pioneer soil conservationist. Washington, in his last message to Congress, suggested the establishment of a department of agriculture to collect and disseminate information. Experimenting with fertilizers, and from ideas gained abroad, he began a system of crop rotation and soil improvement. His methods of procedure are given.

MITCHELL, JONATHAN.

(378)

MR. WALLACE TRIES AGAIN. New Repub. 87: 41-43. May 20, 1936.

Discusses the "soil-conserving" payment and the "soil-maintenance" payment of the Soil Conservation and Domestic Allotment Act with special reference to idle acres and intensive farming on the part of low-cost producers. Under the Soil Conservation Service program farmers "are doing voluntarily—without the hope of any reward other than the improvement of their land—all that the S. C. A. D. A. would bribe them to do at the rate of \$10 an acre . . . Because it is so largely concerned with restricting production, it is a poor device for soil conservation."

MORGAN, A. E.

(379)

THE NEXT FOUR YEARS IN THE TVA. New Repub. 89: 290-294. January 6, 1937.

This is the sixth in a series of articles on various aspects of the next 4 years of American life. The author discusses navigation, flood control, and power, various types of power policy, social and economic planning, and what planning could do. It is pointed out that "while the government is spending millions of dollars to prevent soil erosion, the small-scale mountain farmers of this region, hard-pressed for sources of livelihood, are clearing steep mountain sides for three or four corn crops before the soil is washed away and the land destroyed . . . At present the TVA law does not provide a legislative basis for meeting this problem."

- MORGAN, A. E.** (380)
 SOIL EROSION IN THE WEST. *Amer. Forests* 36: 205-206, illus. April 1930.
 The author tells how soil washing in the West has "dug in" and entrenched itself, particularly on the public domain. The filling of reservoirs with silt and the continual process of gully formation with their disastrous consequences are discussed. He contends that "to get lasting results we must attack the trouble at its source." The use of small and larger dams and the planting of suitable shrubs and trees in stream beds and smaller gullies are advocated.
- MOSIER, J. G.** (381)
 WASHING OF SOILS AND METHODS OF PREVENTION. *Ill. Agr. Expt. Sta. Circ.* 119, 16 pp. illus. May 1908.
 Figures on acreage subject to serious erosion are quoted. "If this destruction of soils is as rapid in the future as it has been in the past, large areas will be abandoned and depopulated in Illinois." Prevention of sheet washing through cover crops, terraces, and hillside ditches, together with concrete dams for filling gullies are recommended.
- **AND GUSTAFSON, A. F.** (382)
 WASHING OF SOILS AND METHODS OF PREVENTION. *Ill. Agr. Expt. Sta. Bull.* 207, pp. 512-550, illus. 1918.
 "Based on the results of detailed soil surveys made in 62 counties of Illinois, it is stated that 15.2 percent of the land is of such a character as to be subject to serious damage from surface washing, or run-off . . . The measures deemed best for the prevention of sheet washing include (1) growing cover crops, (2) increasing the organic matter content, (3) employing proper tillage methods, (4) tiling, and (5) constructing terraces and embankments. Means for dealing with gullies embrace reforestation and damming with straw and sod held in place by stakes or by concrete."—*Expt. Sta. Rec.* 39: 322. 1918.
- MUNDT, K. E.** (383)
 LET'S APPRAISE CONSERVATION. *Successful Farming* 34: 16, 30-32. November 1936.
 Points out that there is money in conservation, especially water conservation. Suggests formation of farm ponds by damming watercourses for raising fish and muskrats for revenue.
- MURRAY, F. J.** (384)
 PAUL BUNYAN READS THE RECORD OF THE CCC. *Amer. Forests* 43: 154-158, 201, illus. April 1937.
 The author recounts the amusing story of the legendary giant Paul Bunyan who now lives on the Milky Way observing the work accomplished by the C. C. C. Data on soil conservation are given along with conditions in general at C. C. C. camps.
- MUSSER, R. H.** (385)
 WITHSTANDING A TEST THAT COMES ONCE IN A CENTURY. *Soil Conserv.* 3: 43-44, 52, illus. August 1937.
 Erosion-control practices in the West Tarkio River demonstration area in Atchison County, Mo., are described. An account is given of a rainstorm of unusual intensity on April 21, 1937. Discusses terraces, gully dams, and run-off.
- MYER, D. S.** (386)
 THE NEW PICTURE IN AGRICULTURE. *Act* 19: 7-12. September-October 1936. [Mimeographed.]
 Briefly traces important governmental services and activities recently initiated which have brought about a changing picture in agriculture. Comments on the inception of the Soil Conservation Service, also the grazing administration which "was established in order to provide better control over the public domain, and to establish sound grazing practices which would help conserve the domain."

NAHMER, A.

(387)

OUR RAINLESS LANDS. AND HOW THEY MAY BE RECLAIMED. A SUGGESTION.
Forest Leaves 2: 70-71. June-July 1889.

Insufficient rainfall for successful agriculture in the vast regions of the West is discussed together with irrigation measures employed by the Romans, Egyptians, Medes, and Persians. A suggestion is made to consider the methods of Prussia, which in some parts is covered with an arid gravel, and which is being reclaimed and converted into fertile fields through the cultivation of lupine and vetch. "There is probably no plant whose fruits men harvest that requires so little preparation of the soil as the Lupine . . . In about eight days the young plants appear above the surface and grow rapidly, especially when there is no rainfall." Detailed advice on cultivation is given.

NATIONAL CONSERVATION COMMISSION.

(388)

REPORT OF NATIONAL CONSERVATION COMMISSION. 60th Cong., 2d sess., S. Doc. 676, 12 v. 1909.

President Theodore Roosevelt, in a special message transmitting this report, said: "It is one of the most fundamentally important documents ever laid before the American people. It contains the first inventory of its natural resources ever made by any nation. In condensed form it presents a statement of our available capital and material resources, which are the means of progress, and calls attention to the essential conditions upon which the perpetuity, safety, and welfare of this nation now rest and must always continue to rest. It deserves . . . the widest possible distribution among the people." Among the articles in volume 2 are Denudation, by R. B. Dole and H. Stabler, includes a summary presenting in tabular form denudation estimates for the primary drainage basins and for the whole United States; and floods, by M. O. Leighton. Other papers on irrigation and forestry are in this volume. In volume 3 are Conservation of the Fertility of the Soil, by H. W. Wiley, and Relations of Birds and Mammals to the National Resources, by C. Hart Merriam.

NATIONAL CONSERVATION CONGRESS.

(389)

ADDRESSES AND PROCEEDINGS. 1-3. Natl. Conserv. Cong. 1909-12.

The proceedings of the first congress contains papers on the utilization of the Nation's natural resources, soil erosion, and related subjects among which are The Relations Among the Resources, by W. J. McGee, pp. 96-102; and The Civic Aspect of Conservation, by H. A. Barker, pp. 103-107.

Among the papers in the proceedings of the second congress are: Conservation in Country Life, by L. H. Bailey, pp. 203-213; and Forests and Stream-flow, by W. S. Harvey, pp. 428-429. These two papers have to do with the utilization of America's natural resources, soil conservation, and related subjects.

Among the addresses and papers presented at the third congress on the utilization of natural resources, soil conservation, and related subjects are: Resolutions of the Third National Conservation Congress, p. XV; and Live Stock Farming and Soil Fertility, by F. B. Mumford, pp. 231-234.

NATIONAL INDUSTRIAL CONFERENCE BOARD.

(390)

THE CONDITION OF AGRICULTURE IN THE UNITED STATES AND MEASURES FOR ITS IMPROVEMENT. Natl. Indus. Conf. Bd., N. Y., pp. 105-108. 1927.

"It is estimated that every year $1\frac{1}{2}$ billion tons of soil material are removed by erosion and with it about 60 million tons of plant food. Though these figures . . . cannot presume to be exact, they indicate the trend."

NATIONAL RESOURCES BOARD.

(391)

INVENTORY OF THE WATER RESOURCES OF THE NORTH PACIFIC DRAINAGE AREA. 117 pp., illus. [Seattle, Wash.] June 1935. [Multigraphed.]

NATIONAL RESOURCES COMMITTEE AND WATER RESOURCES COMMITTEE.

(392)

FEDERAL AGENCIES CONCERNED WITH WATER USE AND CONTROL. Natl. Resources Com. and Water Resources Com. 36 pp., illus. 1936. [Mimeographed.]

Outlines the cooperative programs of Government agencies under the Departments of Agriculture, Commerce, Interior, State, Treasury, and War, and independent agencies in water conservation. The relation of water conservation to soil erosion is considered.

- NATIONAL RESOURCES COMMITTEE, SUBCOMMITTEE ON TECHNOLOGY. (393)
TECHNOLOGICAL TRENDS AND NATIONAL POLICY INCLUDING THE SOCIAL IMPLICATIONS OF NEW INVENTIONS. 388 pp., illus. Washington, Govt. Print. Off. 1937.
Partial contents: Soil: Its Use and Conservation, by J. K. Ableiter and Leland Barrows, pages 120-123.
- NEBRASKA STATE BOARD OF AGRICULTURE. (394)
ANNUAL REPORTS . . . 1935, 1936. 1936-37.
The 1935 report contains the following articles relating to soil conservation: The Federal Shelterbelt Project, by H. D. Cochran, pp. 83-89; Eulogy to Grass, by J. J. Ingalls, p. 121; The Most Profitable Use of Land as Shown by Nebraska Farm Records, by A. G. George, pp. 124-132; Making the Most of Nebraska, by J. E. Lawrence, pp. 147-153; Value of Terracing, Contour Farming, Strip Farming, and Other Practices in Conserving Precipitation, by I. D. Wood, pp. 190-199; Making the Most of Rainfall through Soil and Crop Management, by J. C. Russell, pp. 199-206.
Partial contents of the 1936 report: A Practical Program for Soil Conservation, by M. F. Miller, pp. 185-194; Plans For the Wider Use of Native and Introduced Grasses For Soil Conservation in Nebraska, by Jess Fuels, pp. 235-240; The Relation of Rainfall Distribution, Soil Moisture, and Crop Rotation to the Yield of Potatoes at the Box Butte Experiment Farm, by H. O. Werner, pp. 715-731; Maintenance of Organic Matter in Dry-Land Soils, by L. L. Zook, pp. 737-747.
- NEEL, L. R. (395)
TO HAVE AND TO HOLD. THE STATE AS WELL AS THE INDIVIDUAL HAS AN INTEREST IN THE FARM. South. Agr. 67: 8, illus. January 1937.
Predicts passage of laws in all States looking toward the wisest possible use of the land. Mentions Wisconsin's zoning law which withdraws from agricultural use some of the poor land, also several other practices which have tended to encourage soil building and conservation. "Starting 10 or 12 years ago the Federal Land Bank at Houston, Tex., inaugurated the practice of requiring an efficient system of terracing on lands when loans were granted."
- NELSON, A. L. (396)
SOIL EROSION—ARCHER FIELD STATION, WYO. Agr. Expt. Sta. Bull. 20S, 35 pp., illus. 1935.
"The natural factors which erode arable land in this region are continued high winds, and, to a less degree, down-pouring rains, generally of short duration. The destruction of vegetation, the small amount of organic matter in the soil, the loose nature of the soil, especially if sandy, and the semi-arid conditions are other factors that contribute to the erosion problem. . . . Factors that aid in the control of soil blowing are shallow tillage of a nature that produces clods and leaves the organic matter at the surface, ridging the soil at right angles to the prevailing winds, strip farming, the growing of sod crops, and providing shelterbelts or windbreaks."
- NELSON, PETER. (397)
INFORMATION ON SOIL CONSERVATION. Okla. Agr. Expt. Sta. Current Farm Econ. 10, 22 pp. February 1937.
On pages 13-15 an attempt is made to reduce replies received from experiment station directors and regional directors of the Soil Conservation Service into a general perspective of available knowledge of the soil conservation problem. "Indications are that physical conservation, that is, prevention of erosion by means of mechanical structures or by means of certain types of plant cover, can be achieved generally. The economics of conservation, on the other hand, is an almost unexplored field."
- NICHOLS, ALICE. (398)
SOIL CONSERVATION SERVICE. N. J. Municipalities 13: 12-13, 27. April 1936.
An account of the operations and projected programs of the Soil Conservation Service in New Jersey.

- NICHOLS, M. L., AND SEXTON, HUGH. (399)
 SOIL EROSION STUDIES. Ala. Agr. Expt. Sta. Rept. 43: 9-10. 1932.
 The progress of studies in soil erosion at the Alabama Agricultural Experiment Station are noted.
- NIVEN, L. A. (400)
 SOIL EROSION AGGRESSIVELY ATTACKED IN TENNESSEE VALLEY. Prog. Farmer (Miss. Valley Ed.) 50: 7, 57, illus. May 1935.
 Tells how the Department of Agriculture, in cooperation with the Tennessee Valley Authority and the land-grant colleges, is combating erosion in the South. The general program is outlined. Article also discusses erosion studies at the Bethany station in Missouri and the Guthrie station in Oklahoma.
- NORMAN, C. A. (401)
 SOIL EROSION AND ITS PREVENTION. Breeders' Gaz. 82: 112, illus. August 3, 1922. [Also published in Amer. Fert. 59: 63. November 3, 1923.]
 The causes of erosion and methods of prevention, including Mangum terraces and cover crops, are discussed. Costs of terracing are given.
- NORRIS, R. V. (402)
 SOIL EROSION. Tea Quart. 9: 133-144. December 1936.
 Principles of erosion control in Ceylon and recommendations for future progress are given, emphasis being laid on the importance of soil cover "as the first line of defense against erosion." Refers briefly to drains, hedging, terracing, and similar works. An address given at Badulla, November 7, 1936.
- NUNN, ALEXANDER. (403)
 STOP THE SOIL THIEVES NOW. Prog. Farmer (Ga.-Ala. Ed.) 50: 8, 27, illus. October 1935.
 The author gives figures on soil losses throughout the United States and discusses control research at Soil Conservation Service projects in Alabama and Georgia. He states that terracing alone is insufficient and must be augmented by strip cropping. Vetch and kudzu are highly recommended for protective cover.
- OHIO AGRICULTURAL EXPERIMENT STATION. (404)
 FIFTY-FOURTH ANNUAL REPORT. Ohio Agr. Expt. Sta. 1935. 133 pp., illus. 1936.
 Partial contents: More and Better Legumes Needed for Economic Production and Soil Conservation in Ohio, page 17; Continuous Cropping Versus Rotation, page 17; Erosion Losses of Soil From Soil Fertility Plots, page 21; Studies Relating to an Agricultural Land-Use Program in Ohio, page 95; Nonsilage Ration Efficient, page 101.
- OKLAHOMA AGRICULTURAL AND MECHANICAL COLLEGE. (405)
 A SOIL RESOURCES PROGRAM FOR OKLAHOMA. Okla. Agr. Col. Ext. Cir. 335, 7 pp., illus. 1936.
 "An Oklahoma soil resources program must be carried forward by Oklahoma farm people and cooperating agencies." An appraisal of the State's soil resources follows, and suggestions for improvements are listed.
- OKLAHOMA STATE SOIL CONSERVATION CONFERENCE. (406)
 PROCEEDINGS OF THE STATE SOIL CONSERVATION CONFERENCE, OKLAHOMA CITY, NOVEMBER 1, 1929. 61 pp. 1929.
 Papers read at this conference were the following: Two Acres For One, by Clarence Roberts; Soil Depreciation by Erosion, by H. H. Bennett; The Biggest of Oklahoma's Three Big Problems, by Chas. N. Gould; The Basic Wealth of Oklahoma, by W. T. Holloway; The Importance of Soil Fertility to Human Happiness, by H. G. Bennett; The Banks Interest in Erosion Control, by M. H. Gossett; Interests of The Landowner and Tenant in Erosion Control, by P. A. Norris; Oklahoma's Indian Land Problem, by W. W. Hastings; The Pittsburg County Plan, by E. H. Houston; Moisture Conservation by Terracing, by H. H. Finnell; Airplane Visions of Erosion, by C. A. Border; Practical Farm Relief, by C. P. Blackwell; Formulating

a Land Policy for Oklahoma, by D. P. Trent; The Time Element in Erosion Control, by Major L. A. Jones; Ditches and Ditch Control, by W. H. McPheters. A general discussion concludes the proceedings.

OLSON, CARL R. (407)

FREEPORT SOIL CONSERVATION PROJECT OBSERVATIONS. Stephenson County Farm Monthly 18: 9, illus. September 1936.

OLSON, LOIS. (408)

SOUTH AFRICAN PROBLEMS PARALLEL THOSE OF GREAT PLAINS. Soil Conserv. 3: 18-21, illus. July 1937.

"In planning for research and establishing erosion-control work, South Africa has recognized the similarity between environment in that country and in sections of the Great Plains of the United States, and has utilized the results of our experience."

OOSTHUIZEN, E. A. (409)

CATCHMENT AREAS AND SAFETY OF SOIL-EROSION WORKS. Farming in So. Africa 11: 317-318, illus. August 1936.

It is pointed out that the South African "campaign against soil erosion is . . . dependent upon the efficacy of the measures taken for controlling flood-waters to which such works are exposed." The purpose is "to demonstrate in a popular way how the maximum discharge of a catchment area may be determined approximately in a practical manner."

PACK, A. N. (410)

CONSERVATION; SOLVING THE BUREAUCRATIC JIG-SAW PUZZLE. Nature Mag. 26: 105-106. August 1935.

Proposes the centralization of Federal bureaus having to do with conservation to obviate the lack of coordination among the present bureaus. A Department of Conservation is suggested, having control over the Forest Service, Bureau of Biological Survey, National Park Service, Bureau of Fisheries, Division of Grazing, Soil Conservation Service, Bureau of Reclamation, etc.

PAINTER, D. T. (411)

SAVE SOUTHWEST VIRGINIA SOIL. South. Planter 97: 7, 36-37, illus. April 1936.

The author discusses soil conservation and land-use methods as practiced during the past year in nine southwest Virginia counties that lie wholly or partly within the Tennessee River watershed. He includes flood prevention, the soil and pasture problems, and programs of the Extension Division and the Division of Forestry of the T. V. A. in erosion control on submarginal land.

PALESTINE DEPARTMENT OF AGRICULTURE AND FORESTS. (412)

ANNUAL REPORT . . . MARCH 1935. 200 pp. 1936.

In the section, Soil Erosion and Water Run-Off, pages 108-109, the statement is made "that the advent of normal rainy seasons would be inevitably followed by a recrudescence of grave damage due to flooding and soil erosion, and this has unhappily proved to be the case during the last rainy season. The losses of fertile top soil from the hills and fields in many parts of the plains must be enormous, while the wastage of water which might be conserved by widespread afforestation in the hills is incalculable in a country whose gravest disadvantage is the paucity and uncertainty of the rainfall and the general shortage of water during a prolonged and entirely rainless summer."

PALMER, E. L. (413)

CONSERVATION. Cornell Rural School Leaflet 29: 16-21, illus. January 1936.

On pages 16-21 the subject of soil and water is treated. The wisest use of waterways and the general problem of water utilization are reviewed.

PARK, MALCOM. (414)

THE SOIL EROSION QUESTIONNAIRE—1935. Trop. Agr. [Ceylon] 87: 106-117. August 1936.

Includes questionnaire, sent to about 1,200 estates in Ceylon to find out what progress had been made with soil conservation measures since the

publication of the report of the soil erosion committee. A tabulation of results also is included. It is noted that increasing attention is being given to soil-conserving measures, especially the introduction of cover crops.

- PARKINS, A. E., AND WHITAKER, J. R., EDITORS. (415)
OUR NATURAL RESOURCES AND THEIR CONSERVATION. 650 pp., illus. New York, J. Wiley & Sons, Inc. 1936.

"This volume is a symposium, written by scientists each of whom for many years has worked and thought in the field of which he writes." Some of the headings are as follows: Soil Erosion and Its Prevention; The Problem of Our Grasslands; Our Forests, Past and Present; Water Power and Its Conservation; and Conservation of Wildlife. Reference maps, agricultural data, and selected bibliography are included in an appendix.

- PARKINSON, LOUIS. (416)
LAND CONSERVATION. *Amer. Farm Youth* 2: 10, 16, 19. October 1936.

The loss of fertile lands through all types of erosion both here and abroad is discussed and a solution for soil erosion offered.

- PAUL, J. H. (417)
WHAT CONSERVATION AND REFORESTATION WOULD MEAN TO THE WEST. 20 pp. Salt Lake City, Deseret Book Co. 1933.

The author has condensed the subject of public interest and disinterest in reforestation and stresses the need of cooperation. Why Nations Decline, and Science Warns the World are subheadings of points discussed. The building of dams and the planting of trees and shrubs are advocated.

- PENDLETON, R. L. (418)
EROSION OF AGRICULTURAL SOILS IN THE PHILIPPINES. *Sugar News* 16: 237-248, illus. May 1935.

The writer says that the serious erosion on the islands of Luzon, Negros, and Cebu is aggravated by methods of cultivation suitable only for nearly flat lands which are not susceptible to erosion. He suggests various methods of contour or near-contour cultivation on sloping fields, with forest crops and permanent cover for control of erosion. "It is evident from the numerous photographs accompanying this paper that soil erosion in the Philippines is serious, and that much of our land is deteriorating in value, due to the loss of the most fertile portion of the soil."

- PENZHORN, K. E. W. (419)
SOIL EROSION ON CULTIVATED LANDS. *Farming in So. Africa* 11: 251-252, illus. June 1936.

Factors in soil erosion such as nature of rainfall, soil type, site, slope of land, and erosion-preventive measures are discussed.

- PERSON, H. S. (420)
LITTLE VALLEY. *Survey Graphic* 25: 303-305, illus. May 1936.

Tells how two residents of a small American town became aware of the menace of soil erosion and aroused their farmer neighbors from their indifference to a full realization of the problem. How erosion was checked in this typical midwestern valley is told.

- COIL, E. J., AND BEALL, R. T. (421)
LITTLE WATERS. A STUDY OF HEADWATER STREAMS AND OTHER LITTLE WATERS, THEIR USE AND RELATIONS TO THE LAND. 82 pp., illus. Washington, Govt. Print. Off. 1936. [Review by Maury Maverick, *Cong. Rec. App.*, pp. 3130-3131. February 28, 1936.]

"If the land perish, how shall man survive?" With this foreword the authors discuss the problems of erosion control, rural rehabilitation, and rural electrification. The authors base their statements on scientific data furnished by various Federal, State, and private agencies and suggest the desirability of a comprehensive program of conservation of land and water. The natural circulation of waters and the role of vegetative cover are considered. On pages 29-36 the serious loss through accelerated erosion is described and discussed. In part III the authors suggest the lines of action to be followed in the reestablishment of Nature's arrangements for the circulation of waters, and make recommendations of improved farm

practices, including rotation of crops, check dams in gullies and on streams, ponds, and reservoirs, with especial reference to the individual farm and small communities.

PETERSON, EBNER T. (422)
THE CRIME OF MUDDY RIVER. *Rotarian* 47: 24-26, 58-61, illus. August 1935.

"The purpose of this article is to furnish a few facts to show that these various forms of natural misfortune [wind and water erosion, drought and floods] are very much bound together in a common problem—that if the close relationship is not understood, the problem cannot be solved—that the solution of the problem depends largely upon what man does, rather than upon the caprice of nature." The basic consideration is water. "Water, when kept where it falls, does not accumulate in large moving columns, fails to erode sloping soil, combats drought, feeds a tree and vegetable mat which prevents wind erosion, and preserves wild animal life." Terracing, reforestation, damming of dry watercourses, and restoration of grass sod are advocated among other measures for erosion control.

PETERSON, W. (423)
CONSERVATION OF THE PUBLIC DOMAIN. *Utah Agr. Col. Ext. Cir.* 39, 11 pp. 1931.

The possibilities of rehabilitating the public domain through forest protection on watersheds, and restriction and proper distribution of animals on overstocked ranges are discussed. "Erosion is the problem associated with the hazards of floods and silting of streams and reservoirs. The intensity of erosion is a factor of soil type, gradient, rainfall, elevation and vegetative cover." The need for more experiment stations is stressed.

— CLYDE, G. D., JENNINGS, D. S., THOMAS, M. D., AND HARRIS, K. (424)
CACHE COUNTY WATER CONSERVATION DISTRICT NO. 1. *Utah Expt. Sta. Bull.* 193, 47 pp., illus. 1925.

A discussion of location and area, transportation, community development, schools, and industries, with a history of the county.

PIEDALLU, A. (425)
LA LUTTE CONTRE L'ÉROSION ET L'EXPLOITATION DES PENTES. *Jour. Agr. Prat.* 63: 128-131, illus. February 9, 1935.

Deforestation in France has caused much soil erosion. The author tells of erosion-control methods put into practice in southern Algeria, and describes the use of dynamite in constructing terraces and trenches and advocates these measures for the conservation of moisture in France as well as in her colonies.

PINCHOT, GIFFORD. (426)
THE FIGHT FOR CONSERVATION. 152 pp. New York, Doubleday, Page & Co. 1910.

"The following discussion of the conservation problem is not a systematic treatment upon the subject. While not arranged chronologically, yet the articles here grouped may serve to show the rapid, virile evolution of the campaign for conservation of the nation's resources." Chapter headings include: Better Times on the Farm; Principles of Conservation; Waterways; The Moral Issue; Public Spirit; The New Patriotism; and The Present Battle.

IT CAN HAPPEN HERE. *Amer. Forests* 43: 282-283, 321. June 1937. (427)

Opposes reorganization of the Executive Departments. "The Conservation policy includes not only forests, waters, lands, and minerals . . . It includes also the conservation of human resources, and other human interests."

PITCAIRN, A. (428)
REPORT ON SOIL EROSION IN CYPRUS. *Cyprus Dept. Agr. Bull.* 3, 31 pp., illus. May 1937.

Types of erosion, conditions which are allied to or conducive to erosion in Cyprus, historical data, present extent of and measures recommended for erosion control.

PITCHER, D. G.

(429)

SOIL EROSION IN CENTRAL INDIA. Irrig. Com. Rept. (1901-3) 3. Appendix. 1903.

In giving evidence on irrigation practices in Gwalior, central India, the writer maintained that ravines in which the land was previously uncultivable and useless had been made productive and valuable by the introduction of silt. He considered that by extending the system of minor irrigation, material improvement would be made in the matter of checking denudation. The advantages of tanks for water conservation and distribution were stressed. The use of embankments for checking flow water is discussed.

PRESCOTT, C. C.

(430)

VALUED AT FIVE BILLION DOLLARS. Prog. Farmer (Miss. Valley Ed.) 50: 7, illus. February 1935.

The erosion-control program of the Soil Erosion Service projects is outlined showing how attempts are being made to eliminate bankrupt farming on bankrupt land.

PRIDMORE, J. C.

(431)

EROSION OF AGRICULTURAL LANDS. Breeders' Gaz. 61: 647-648. March 13, 1912.

In a letter the writer points to the washing of lands particularly in the South. "Conditions in the South favor a rapid rate of water erosion, especially in the upland regions." He advocates reforestation, terracing, and better cultural methods.

PUERTO RICO AGRICULTURAL EXPERIMENTAL STATION.

(432)

REPORT OF THE PUERTO RICO EXPERIMENT STATION, 1935. 34 pp., illus. Washington, Govt. Print. Off. 1936.

Soil erosion control as a basic reconstruction problem is discussed, pp. 12-13. It is stated that heavy rainfalls, coupled with the nature of the topography, have made soil erosion a very important factor in the agriculture of the island. The importance of research work to check erosion is emphasized.

PUERTO RICO RECONSTRUCTION ADMINISTRATION.

(433)

THE NEED FOR FEDERAL AID IN PUERTO RICO. THE PURPOSES OF THE PUERTO RICO RECONSTRUCTION ADMINISTRATION. 6 pp. Washington, Govt. Print. Off. 1936.

"Puerto Rico is predominantly agricultural. For decades erosion under tropical rains has gone unchecked. Absentee ownership has driven those formerly dependent upon the soil to the already congested urban areas which are lacking in proper and adequate housing facilities. Consequently, it is of the utmost importance to encourage the return to the rural areas of the farmers and farm workers by restoring the farm lands to them." A sum of \$994,140 has been allocated for the reforestation and forestation project.

PURDUE, A. H.

(434)

THE IMPORTANCE OF SAVING OUR SOILS. Resources of Tenn. 3: 50-53. January 1913.

Discusses the value of land, the origin of soil, and the process of erosion. Practical information is given on the prevention of soil wash by means of grass plantings and terracing.

QUERNA, G. M.

(435)

SNOW MAY BECOME DESTROYER OF SOIL. Wash. Farmer 62: 91, illus. February 18, 1937.

"Steep north slopes are characteristic of the Palouse country and much of the Walla Walla area. Snow bank erosion has played an important role in their formation, especially since man has removed the natural grass covering. Measures to control this type of erosion have been practiced with varying degrees of success by the Soil Conservation Service on its demonstration areas. Plantings of grass and legumes have been shown to help hold the snow and to tend to prevent run-off and loss of snow water. Trees . . . serve to hold snow and reduce erosion correspondingly."

RAIKES, C. F. G. (436)
SOIL EROSION IN SOUTH AFRICA. Northwest. Miller 186: 503. May 20, 1936.

"In a report published in the 'Commercial Intelligence Journal', of Ottawa, it is stated that the anti-erosion plans launched [in South Africa] in 1933 have yielded excellent results. One important method adopted is the construction of catchment basins for water. These have more than paid for themselves in tiding livestock over dry periods and serving as a source of water supply for small irrigation schemes, particularly in enabling small acreages of alfalfa to be grown as supplementary feed for livestock."

RATCLIFFE, F. N. (437)
SOIL DRIFT IN THE ARID PASTORAL AREAS OF SOUTH AUSTRALIA. Aust. Council Sci. and Indus. Research Pamphlet 64, 84 pp., illus. 1936 [Summary in Jour. Dept. Agr. So. Aust. 39. (11): 1341. June 1936.]

Some of the topics discussed are: Principal Vegetative Types; Causes and Progress of Drift; Water Erosion; Pastoral Policy and Land Administration; Erosion Problems in Other Countries; The Possibilities of Recovery. "The investigation on which this report is based was limited to the arid pastoral areas of South Australia which receive an average annual rainfall of less than 10 inches and are devoted almost exclusively to sheep . . . The serious drift which follows the erosion of light sandy soils is described; and it is suggested that drift sand may not be as far-travelling as is generally assumed to be the case." Appendix I.—The Rabbit in the Arid Pastoral Country, pages 72–82.

REDDICK, H. E. (438)
EROSION AND THE CITRUS GROWER. Calif. Citrogr. 20: 235, illus. June 1935.

Illustrations are given of what erosion does to the land and how it may be stopped. Injury to citrus orchards by sheet erosion and gullying is stressed, and the benefits to be derived from terracing for protection of the soil and conservation of moisture are stated.

THE WAR AGAINST EROSION IN CALIFORNIA. Pacific Rural Press 130: 31, 39. July 13, 1935. (439)

Man-made or accelerated erosion is discussed. In 32 of the 58 counties in California erosion is a real menace to the soil. Wind and sheet erosion and the control work of the United States Soil Erosion Service of California are described.

RENNER, F. G. (440)
CONDITIONS INFLUENCING EROSION ON THE BOISE RIVER WATERSHED. U. S. Dept. Agr. Tech. Bull. 528, 32 pp., illus. 1936.

The relative importance of each factor influencing present erosion conditions is the basis of the author's study. "The survey has brought to light the seriousness of erosion on a valuable watershed and a knowledge of the factors which, under the conditions peculiar to the watershed, have been chiefly responsible for the erosion . . . The results point to the immediate necessity of restoring the plant cover to a density of at least 30 percent, reducing the excessive rodent population, and initiating improvements in range and livestock management which will relieve conditions on areas particularly susceptible to erosion." See also Science 84: 62–63, July 17, 1936.

RICHARDSON, T. C. (441)
SCOTCH THE DRAGON OF EROSION. Farm and Ranch 52: 1, illus. December 15, 1933.

This article summarizes the annual losses caused by soil erosion in the United States and discusses the problem in the Southwest. Terracing in Texas is described.

RINGLAND, A. C. (442)
MUSSOLINI'S SYBARITES. Amer. Forests 39: 291–297, 334, illus. July 1933.

A description of the program of public works instituted by Mussolini in 1928, with special reference to the project being carried out in Calabria at Sibari on the Ionian Sea. Other projects include work of reforestation in Umbria and Udine, and the development of power and irrigation works in

Sardinia, which are described and illustrated. Typifies Italy's national plan for the conservation, reclamation, and utilization of the country's soil and water resources.

RINGLAND, A. C.

(443)

NOTES ON SOIL EROSION AND REFORESTATION IN ITALY: SUGGESTIONS FOR AMERICAN APPLICATION. U. S. Forest Serv. 12 pp., illus. 1934. [Mimeographed.]

This paper gives a general description and costs of the terrace system of the Italian national land plan, known as "Bonifica Integrale," together with details of technique in the field for the stabilization and restoration of soils on steep slopes. The "Gradoni" system used "is nothing more than a small level terrace which varies in width from 2 feet to 4 feet—generally the latter width. It must be absolutely horizontal." Reforestation of Mount Subasio with juniper, hackberry, oaks, black locust, cypress, cedar, beech, maple, and black Austrian pine is discussed.

RITZLER, ROBERT

(444)

THE CONSERVATION PARADOX IN OHIO. Amer. Forests 42: 400-401, 437, illus. September 1936.

Emphasizes the need for a definite conservation program in order to avoid the present lack of coordination between Government departments. Instances are given of anticonservation activities through deforestation of hillsides and the banks of streams.

ROBBINS, L. H.

(445)

THE GOOD EARTH; A REDISCOVERY. N. Y. Times Mag., illus. February 23, 1936.

"Soil has become, all of a sudden, the talk of the nation . . . Soil has not always been here, and there is no certainty that it will stay. The erosion that gave it can take it away." The processes of soil making from earliest ages are outlined, for "since Adam's time the soil has fed, clad, shod, and sheltered mankind, city or country; and to this day cities owe their existence primarily to the traffic in its harvest." A picture is drawn of the rapid destruction and denudation of the country during the past 150 years. "A forward look, in the light of present public discussion, shows a new era for the soil on which the nation has its being . . ." Reafforestation of watersheds, retirement of worn-out lands to be held in reserve, re-seeding of former grasslands, and other conservation measures are discussed as part of the national program for self-protection from the active menace of erosion.

ROCKIE, W. A.

(446)

EROSION AND HOMESTEADING IN ALGERIA. Jour. Amer. Soc. Agron. 23: 580-581. July 1931.

The conditions in some parts of Algeria are somewhat similar to those in northern Mexico and sections of the southwestern United States. The translation of an article on erosion and homesteading in Algeria is given. Soil conservation methods, flood control, and reforestation as projected by the Algerian Forest Commission are described, and comparisons with other countries made.

SNOW DRIFTS AND PALOUSE TOPOGRAPHY. Geogr. Rev. 24: 380-385, illus. July 1934.

(447)

"Agriculture in the Palouse region of the Pacific Northwest presents some radical differences from that in most parts of the country . . . One peculiar phase of the regional erosion problem is presented here—that of snow drifting and associated forms of erosion." Investigations by the Pacific Northwest Soil Erosion Experiment Station Farm are described, and the importance of vegetative cover in this area is stressed.

ROE, H. B.

(448)

SOIL EROSION: CAUSES AND METHODS OF CONTROL. Minn. Univ. Agr. Ext. Spec. Bull. 160, 24 pp., illus. 1933.

"Practical information is presented on the subject. It has been found that sheet erosion is the most harmful type, and that the important contributing causes of erosion are certain current farming practices. The ulti-

mate method of sheet erosion control is that of terracing practically all cropped slopes subject to erosion, coupled with cover cropping and contour cultivation. The best type of terrace for general use is considered to be the standard graded Mangum terrace. Crop rows may be run diagonally across the terraces, but contour planting and cultivation approximately parallel to the terraces are an effective aid in controlling sheet erosion and are recommended."—Expt. Sta. Rec. 70: 252. 1934.

ROE, H. B.

(449)

SOIL EROSION CONTROL AND SOIL MOISTURE REGULATION IN RELATION TO STATE AND NATIONAL LAND-USE PLANNING. Agr. Engin. 15: 428-430. December 1934.

"A proper land-use program . . . requires that an effective supplemental irrigation code be worked out, promulgated and put into practice . . . The proper solution of the moisture-control problem involves the cooperative effort of physiologic, pathologic, agronomic, horticultural, silvicultural, farm management, soil, and engineering science and practice." The author stresses the need for research, education, and application of the principles of soil erosion and moisture control and urges the closer cooperation of the various agricultural experiment stations with the United States Soil Erosion Service.

[ROOSEVELT, F. D.]

(450)

THE FUTURE OF THE GREAT PLAINS. Rural Amer. 15: 10-11. May 1937.

The President comments on the report of the Great Plains Committee, entitled "The Future of the Great Plains." In summarizing the problems of drought he concludes: "Whatever program is adopted must be co-operative and will require complementary lines of action by the Federal Government, State governments and all the citizens of the region individually."

ROOY, A. C. A. VAN.

(451)

EROSION OF THE VELD. Agr. Jour. Cape of Good Hope 34: 158-165. February 1909.

The writer considers the cattle-raising regions with respect to the serious loss of soil and water. The necessity for the stopping of gullies is stressed. Overgrazing of pasture land is blamed for the formation of gullies and other erosion evils. Research into erosion-control measures is advocated to save the veld.

ROSECRANS, W. S., AND OTHERS.

(452)

WATER CONSERVATION IN SOUTHERN CALIFORNIA; SYMPOSIUM. Calif. Dept. Agr. Monthly Bull. 22: 59-77. 1933.

This symposium consists of papers by W. S. Rosecrans, C. Roy Brown-ing, and Vernon Freeman; also one on the engineering phases of water conservation, by F. E. Trask. The discussion was led by J. N. Thille and G. H. Cecil.

ROWALT, E. M.

(453)

SOIL AND WATER CONSERVATION IN THE PACIFIC NORTHWEST. U. S. Dept. Agr. Farmers' Bull. 1773, 59 pp., illus. 1937.

"This bulletin deals with erosion of the soil by wind and water and with the measures recommended and employed by the Soil Conservation Service for the control of erosion on the farms and ranges of the Pacific Northwest. It treats particularly of wheatlands and grazing lands. Soil Conservation is inseparable from water conservation. Therefore, certain sections of the bulletin deal specifically with the conservation of water for the production of crops on nonirrigated lands and the conservation of water for irrigation purposes and flood prevention. Another section deals with the control of drifting sand dunes along the coastal beaches of Oregon and Washington."

(454)

SOIL DEFENSE IN THE PIEDMONT. U. S. Dept. Agr. Farmers' Bull. 1767, 63 pp., illus. 1937.

"This bulletin deals with erosion of the soil and measures of defense which have proved successful in controlling erosion in that part of the Piedmont country lying in the five States of Virginia, the Carolinas,

Georgia, and Alabama. The region is the rolling foothill country of the Appalachian Range, and extends east and south to the fall line which separates the Piedmont from the broad, gently sloping Atlantic and Gulf Coastal Plains."

ROWE, W. P., AND YOUNG, A. A.

(455)

CONSERVATION OF WATER. Amer. Soc. Civ. Engin. Proc. 62: 798-807. May 1936.

Discussion of progress report of the committee of the irrigation division on the conservation of water which was published in December 1935 proceedings. Report is divided into 14 subjects, most of which are discussed in the order presented. Some of them are: Evaporation; Economic Use of Irrigation Water; Soil Erosion; Burning of Native Vegetation; Transportation of Debris; Water Spreading and Flood Channels; Check Dams; Investigations in Water Conservation and Control. A table shows evaporation records at Baldwin Park Station, Calif., (elevation, approximately 400 feet).

RUHL, A.

(456)

SUNKEN EMPIRE. Collier's Weekly 49: 22, illus. August 17, 1912.

"The purpose of this article is to give a general idea of the tremendous possibilities of swamp drainage." The writer states that there were at that time in this country about 75,000,000 acres of fertile land which could be drained and turned into farms. Reference is made to a bill by Senator Williams of Mississippi which would give the Government the right to build drainage projects.

RULE, GLENN K.

(457)

CONSERVING CORN BELT SOIL. U. S. Dept. Agr. Farmers' Bull. 1795, 59 pp., illus. 1937.

"Natural productiveness of most of the soil in America's Corn Belt is on the decline. This publication treats of erosion as a contributing cause. Erosion-control practices, now employed on the extensive project areas of the Soil Conservation Service, are discussed. The region includes a part of the vast central valley in the upper reaches of the Mississippi River and considerable land lying adjacent to its main tributaries, the Missouri and the Ohio."

SAMPSON, A. W.

(458)

RELATION OF EROSION TO SOIL PRODUCTIVITY. Agr. Engin. 12: 114-116, illus. April 1931.

"Accelerated erosion and plant destruction usually go hand in hand. In any problem of regeneration of the plant cover on eroded areas, the physiology and nutritional requirements of the plant community must not be overlooked." Experiments in run-off and leaching by the Missouri Agricultural Experiment Station are described. The author advocates further studies of forest influence with a view to adopting better agricultural practices.

SAMPSON, H. C.

(459)

SOIL EROSION IN TROPICAL AFRICA AND PROBLEMS CONNECTED WITH IT. Rhodesia Agr. Jour. 33: 197-205. March 1936.

"The peoples of tropical Africa are primarily agriculturists. They can be divided into two main categories—namely, the pastoral people, who own cattle, and the agricultural people who do not." Sampson explains how both of these types of farming are responsible for erosion. Methods of cultivation, designed to check erosion, are discussed.

SANDERS, F. R.

(460)

SOIL EROSION AND ITS TREATMENT. (Agr. Notes) Trinidad and Tobago Dept. Agr. v. 4, pp. 1-4. January 1933.

The author considers soils generally and recommends methods of maintaining surface soil through terracing, contour hedging, catchment pits, and contour planting. "Cover cropping in itself is a very efficient way of preventing loss of surface soil and at the same time adding humus."

- SCHMITT, ROY L. (461)
SOIL EROSION. Kans. State Bd. Agr. Quart. Rept. 49 (193A): 46-48. 1930.

An address delivered at the Kansas Agricultural Convention in 1930. Some aspects of sheet erosion are discussed and an estimate of annual losses to the United States is given. Remedial methods are discussed.

- SCHOFFELMAYER, VICTOR. (462)
TEXAS—AN EMPIRE OF THE SOIL. Country Home 60: 10-11, illus. July 1936.

Present-day Texas is sketched. "Come to the Blackland Prairie Belt, where soil is blue-black, and three to ten feet deep. Too good for canny Texans to risk losing through erosion."

- SEARS, P. B. (463)
AMERICA'S WASTED RICHES. Sunday Star [Washington, D. C.], pp. D-3, D-8 (pt. 2). July 18, 1937.

The author brings out the fact that farming methods have neglected soil conservation as a source of wealth. He also discusses the human side of erosion control as opposed to technical aspects of the problem.

- DAMS OR DESERTS: Amer. Scholar 5 (3): 259-269. 1936. (464)

"The continental United States contains about two billion acres of land, about one-half of which can be called farm land. Of this farm land, today about one-fifth either has been impaired if not destroyed by erosion, or is on its way toward that condition . . . And these figures take no account of the manifest, serious damage to western range lands from over-grazing, followed by erosion." The author believes that the ecologist has a definite place in the reorganization of land use.

- DESERTS ON THE MARCH. 231 pp. Norman, Okla., University of Okla. Press. (465)
November 1, 1935.

This study of soil conservation presents a picture of soil erosion in the Southwest. The causes and results of wind erosion are treated at great length. Overgrazing and rodent control are also considered. Protective practices and policies, particularly those of a cooperative and governmental origin, are recommended.

- FLOODS AND DUST STORMS CHILDREN OF THE SAME FOLLY. Sci. News Letter (466)
29 (781): 197. March 28, 1936.

The writer deplores the destruction of living sod on the looser soil types of the semiarid high plains and warns that proper land management must be practiced to prevent recurrent floods and dust storms.

- HIGHWAY MENACE. Soil Conserv. 2: 230-232, 243, illus. April 1937. (467)

The author points out the vast destruction of highways by soil erosion and contends that the remedy is largely an ecological problem.

- SHALER, N. S. (468)
MAN AND THE EARTH. 240 pp. New York, Duffield & Co. 1910.

In a chapter entitled "The Maintenance of the Soil" (p. 120) the author says: "The true aim, therefore, of a conservative agriculture, such as is to maintain the soil in shape to be useful to man for an indefinitely long future, is to bring about and keep the balance between the processes of rock decay and erosion in fitting adjustment." Soil erosion and resultant destruction and the need for reafforestation are discussed.

- SHERMAN, E. A. (469)
EROSION'S CONQUEST OF OUR LAND. Amer. Forests 37: 195-199, illus. April 1931.

"Briefly, concisely, and with illuminating clarity, the author here portrays a national enemy whose insidious invasion of our soil looms as the most sinister pillager of American agriculture . . . Congressman Ketcham has introduced in Congress a bill calling upon the Federal Government and the States to make common war upon this enemy—soil erosion. The author analyzes Mr. Ketcham's remedial proposal with the same forceful

brevity and clarity that he brings to bear upon the problem as a whole."—Editor. This bill, the author states, means "a long term plan . . . a new kind of pioneering. It means building an agriculture that will not disappear in a single generation but will endure and prosper as long as rain falls and water runs."

SHERMAN, E. A.

(470)

SAVING OUR SOIL. *Nation* 136: 401-403. April 12, 1933.

"Soil erosion is the Dr. Jekyll and Mr. Hyde of natural forces. That is why the losses resulting from it have created so little public concern. As Dr. Jekyll it has laid down the fertile soils of the earth. As Mr. Hyde it is the father of floods and a ruthless insidious thief of soil fertility . . . When nature is undisturbed, the action of erosion is uniformly benign. Only as man disturbs the soil are its Mr. Hyde characteristics revealed . . . The writer believes that the time has now come for the nation to make a serious, businesslike effort to stop further losses from soil erosion . . . Applied on a national scale, a campaign to stop unnecessary and destructive soil erosion would be the most far-reaching and constructive work, with the exception of the original task of pioneer land settlement and clearing, ever undertaken by the American people."

SIM, T. R.

(471)

SOIL EROSION AND CONSERVATION. I-IV. *So. African Jour. Indus.* 2: 715-724, 867-881, 962-968, 1034-1042. 1919.

"This report, based on extensive operations in South Africa, deals with the different factors causing soil erosion and methods of prevention and cure . . ."—*Expt. Sta. Rec.* 42: 513. 1920.

SMALL, J. K.

(472)

VEGETATION AND EROSION ON THE EVERGLADE KEYS. *Sci. Monthly* 30: 33-49, illus. January 1930.

The Everglade keys were once entirely covered with hammock (a dense growth of mostly broad-leaved trees and shrubs) in the opinion of the writer. "The more direct evidence in support of this theory is the type of surface erosion of the rock all over the Everglade Keys . . . In the undisturbed hammocks . . . is a rock floor covered with loose humus. The carbonic acid and the humus colloids from this decaying vegetable matter . . . plus rain and capillary moisture and general humidity, have gradually eaten away the softer portion of the limestone." Forms of erosion occurring in this area are discussed.

SMITH, G. O.

(473)

IS USE OF NATURAL RESOURCES WASTE? *Nation's Business* 21: 33-35, 108-110, illus. April 1937.

"A sincere effort to determine how much of the constant appeal for conservation is based on facts and how much is based merely on emotion, with special attention to the current fear of 'land-waste'."

SMITH, J. R.

(474)

IS THIS A PERMANENT COUNTRY? *Survey Graphic* 61. 25-28, 56-61, illus. October 1928.

"No people . . . now or in the past has destroyed its soil so rapidly as we of the United States are now destroying ours." A picture is drawn of the disappearance of cultivated land and soil in contrast to the land as it was in the time of the Indian and the pioneer. The writer contends that an agriculture for the hills is needed in the United States and draws attention to the two processes of propagating and breeding trees. He advocates the cultivation of hickory and other trees to check soil wash on hillsides and as a source of food for man and beast. He quotes the officials of the United States Agricultural Experiment Station at Hawaii as to the algaroba forests which yield large crops of beans and thinks that this Hawaiian bean tree is a major crop tree presenting a type of agriculture having great potentialities.

(475)

MEN AND RESOURCES; A STUDY OF NORTH AMERICA AND ITS PLACE IN WORLD GEOGRAPHY. 729 pp., illus. New York, Harcourt, Brace & Co. 1937.

Emphasizes the intelligent use of resources in contrast with the wasteful practices of the frontiers-men. Frequent use is made of illustrations of

soil-conserving practices, and attention is given to soil loss by wind and water erosion.

SMITH, J. R.

(476)

PLOWS AND POVERTY. Sat. Evening Post 182: 14, 15, 27, 28, illus. July 10, 1909.

"The American farmer is an indiscriminate plowman of land; he brought the habit from Europe, where it was all right . . . This indiscriminate plowing habit is the mother of gully-washing in America." Rainfall is different in America and often causes damage by soil-washing. Hillsides should not be cleared of their original forest or grass covering, but made profitable as orchards or mulberry tree plantations. Pigs feed on the fruit and sell profitably, as a Louisiana farmer proved. Terraced hillsides as in Italy and Sicily produce vast quantities of fruit. The writer asserts that patriotism growing out of national consciousness is going to insist that there be no needless waste of national resources, the greatest of which is soil washing. Research and experimentation in fruit growing are advocated.

(477)

SOIL EROSION AND ITS REMEDY BY TERRACING AND TREE PLANTING. Science (n. s.) 39: 858-862. June 1914.

"The author in discussing erosion of sloping soils, and factors aggravating or retarding this, draws attention to the possibilities offered by the so-called plowless utilization of land, not only for checking erosion, but also for increasing the crop area. This plan includes as main factors (1) forestry by means of crop trees to control erosion and provide forage and food, (2) moisture and fertility control by means of careful terracing."—Expt. Sta. Rec. 31: 317. 1914.

(478)

TREE CROPS: A PERMANENT AGRICULTURE. 333 pp., illus. New York, Harcourt, Brace & Co. 1929.

"Forest-field-plow-desert—that is the cycle of the hills under most plow agricultures—a cycle not limited to China . . . we Americans, though new upon our land, are destroying soil by field wash faster than any people that ever lived . . . A field that is washed away is gone for ages . . . Can anything be done about it? Yes, something can be done. Therefore, this book is written to persons of imagination who love trees and love their country and to those who are interested in the problem of saving natural resources—the basis for civilization."

References to soil erosion in America, pages 296-301.

SNYDER, J. M., AND BARTEL, F. O.

(479)

RESEARCH IN SOIL EROSION. N. C. Agr. Expt. Sta. Rept. 1931: 47-52. 1931.

"A description is given of the work being conducted at the Statesville Soil Erosion Farm in cooperation with the U. S. D. A. Bureau of Agricultural Engineering."—Expt. Sta. Rec. 68: 538. 1933.

SOIL SCIENCE SOCIETY OF AMERICA.

(480)

PROCEEDINGS 1936. 526 pp. Ann Arbor, Mich., Edwards Bros., Inc. 1937. [Processed.]

Partial contents: The Effect of Calcium on the Erodibility of Soils, by T. C. Peele, pages 47-51; Some Relation of Soils From the Erosion Experiment Station, by L. B. Olmstead, pages 61-64; Some Field Observations With Tensimeters, by L. A. Richards and O. R. Neal, pages 71-91; Peat Land in the Service of Flood Control and Water Conservation, by A. P. Dachnowski Stokes, pages 319-321; Conditions in the So-Called Dust Bowl as Revealed by a Recent Soil Conservation Survey, by A. H. Joel, pages 343-344; The Application of Aerial Photography to Land-Use Problems, by M. S. Wright, pages 357-360; Technology of Erosion Control, by M. L. Nichols, pages 393-399; Hydrologic Interrelations of Water and Soils, by R. E. Horton, pages 401-429; Soil Characteristics Influencing the Movement and Balance of Soil Moisture, by L. D. Bayer, pages 431-437; Effect of Soil Characteristics on Plant Development in Relation to Water Conservation, by M. R. Huberty, pages 439-446; Public and Private Aspects of Soil Conservation, by G. S. Wehrwein, pages 447-452; The Significance

of Climatic Studies in Agricultural Research, by C. W. Thornthwaite, pages 475-480; The Nature and Controlling Variables of the Water Erosion Process, by H. L. Cook, pages 487-494; Provisional Problem Areas in Soil Conservation Research in the United States, by E. A. Norton, page 495.

SOUTH AFRICA PARLIAMENT, SENATE.

(481)

REPORT OF SELECT COMMITTEE ON DROUGHTS, RAINFALL, AND SOIL EROSION, TOGETHER WITH PROCEEDINGS OF THE COMMITTEE, MINUTES OF EVIDENCE, AND APPENDIX. So. Africa Parliament, Senate, [Cape Town] 4th sess. 55 pp. June 19, 1914.

The committee found that the condition of the soil and vegetation covering South Africa does not appreciably affect the total amount of the rainfall, though it probably affects its local character and distribution. "... the occupiers of the land, from the earliest times to the present day, have gradually destroyed the vegetation... which formed the natural protection of the soil. This denudation of the soil has been carried on by various means including the burning of veld, the cutting down of trees... the making of road tracks or paths, and the grazing of stock... The combined effect of these various agencies has been calamitous in the extreme. ... The erosion of the soil, as described, has been the immediate or direct cause, and is according to the evidence, the real explanation of the dessication or drying-up of certain areas in the Union. Wherever erosion operates, the rain-water, owing to the exposure and hardening of the earth's surface, combined with the immensely increased run-off, fails more or less to penetrate into the soil; moreover, even the underground water is, owing to the formation of so many sluits [gullies], being drained off in considerable quantities by seepage and otherwise." Remedial measures are outlined. In the minutes of evidence the opinions and practical experiences of engineers, farmers, and forestry officials on erosion and its control are given.

SOUTHWEST CONFERENCE ON SOIL AND WATER CONSERVATION.

(482)

REPORT OF PROCEEDINGS 2, 4, 5, 6, AND 7. 1929-1937

Papers presented at the first conference are as follows: The need for a Southwest Program of Soil and Water Conservation, by T. O. Walton; An Extemporaneous Address on the Erosion Problem, by A. G. McCall; Cost of Soil Erosion, by H. H. Bennett; A Discussion on Terracing and Flood Control, by B. F. Williams; The Viewpoint of the Press, by Frank P. Briggs; The Banker, by M. H. Gossett; The Implement Manufacturers' Viewpoint, by Cal E. Kerr; On Erosion in New Mexico, by G. R. Quesenberry; Some Oklahoma Views, by G. E. Martin; Outline of Program of Work on Soil and Moisture Conservation for Oklahoma, by C. P. Blackwell; The Texas Program for Soil and Water Conservation by A. B. Cannon; Kansas Soil and Water Conservation Program, by R. I. Throckmorton; The Louisiana Program, by C. T. Dowell; and Research Work Having to Do With Problems of the Conservation of Soil and Soil Moisture in the Utilization of Water, by Albert S. Curry.

The proceedings of the Second conference were published as Okla. Agr. Expt. Sta. Cir. 79. The main headings are as follows: Objects of the Meeting, by O. B. Martin; Research Program of Soil Erosion in Oklahoma, by C. P. Blackwell; The Oklahoma Soil Erosion Survey, by N. E. Winters; The Soil Conservation Research Program for the Southwest, by A. G. McCall; Experimental Work on Soil Erosion and Water Control in Texas, by R. E. Dickson; Experimental Work in Texas, by Robert A. Norton; Experimental Work in Kansas, by F. L. Duley; Experimental Work at Hays, Kansas, by Raymond R. Drake; Soil Erosion in Western Mississippi, by G. H. Lentz; There Can Be Too Little Erosion, by M. F. Miller; Study of Run-off From Terraced Fields, by R. W. Baird; Address, by W. J. Holloway (Governor of Oklahoma); Soil Erosion Work, by Samuel W. Phillips; Results of Experiments on Erosion Control on the Guthrie Soil Erosion Experimental Farm, by R. E. Ramser; Engineering Experimental Program of the Southwest, by L. A. Jones; Handling Run-off from Terraced Fields, by L. E. Hazen; Report on Protecting Road and Hillside Ditches with Concrete Baffles, by W. H. McPheters; Soil Erosion, by H. H. Bennett; The Texas Extension Program in Soil Conservation and Results, by O. B. Martin and M. R. Bentley; Extension Program in Bowie County, Texas, by W. R.

Holsey; The Missouri Extension Program in Soil Conservation and Results, by M. F. Miller; The Kansas Extension Program in Soil Conservation and Results, by F. L. Duley; The Louisiana Extension Program in Soil Conservation and Results, by W. B. Mercier; Arkansas Extension Program in Soil Conservation and Results, by E. E. Scholl; Extension Work in Payne County, Okla., by Lloyd Godley; A Type of Education that Functions on the Farm, by E. B. Nelms; How Can the Press Assist in the Soil and Moisture Conservation Program, by F. Briggs; and What the Federal Land Bank of Houston is Doing, by A. K. Short. Brief summaries, by R. H. Rush and Victor H. Schoffemayer are also given. Proceedings for third conference were not published.

Table of contents, papers of the fourth conference: Control of Soil Erosion by Terracing on the U. S. Experiment Farms, by C. E. Ramser; Some Definite Information Regarding the Cost of Terraces, by H. S. Riesbol and R. W. Baird; How to Evaluate Terraced Land, by A. K. Short; The Effect of Contour Farming on Soil and Water Control, by John S. Glass; Erosion Control Work Done By the Aetna Life Insurance Company, by G. M. Reed; What To Do in Addition to Terracing; The Formation of a Soil and Water Conservation Program For the Southwest, by F. L. Duley and R. P. Bartholomew; Resolutions Adopted by the Southwest Soil and Water Conservation Conference; Officers of Southwest Soil and Water Conservation Conference, 1933-34; and What Methods other than Terracing Should Be Used to Conserve Soil and Water, by H. V. Geib.

The main headings in the report of proceedings of the fifth conference are as follows: The Essential Character of Water Conservation and Erosion Control, by R. V. Allison; Recent Engineering Results of the Federal Erosion Stations of the Southwest, by C. E. Ramser; Effect of Organic Matter in the Control of Soil Erosion, by H. J. Harper; Recent Developments of Strip Cropping and Water-Furrowing for Erosion Control, by B. H. Hendrickson; New Type Terraces and New Terracing Machines, by John S. Glass; What Field of Investigations Should Be Entered Into in Order to Develop All Practical Measures of Soil Erosion Control, by C. P. Blackwell; Soil Erosion and Land Utilization for Kansas, by F. L. Duley; Soil Erosion and Land Utilization for Oklahoma, by N. E. Winters; Soil Erosion and Land Utilization for Missouri and Iowa, by R. E. Uhlant; Soil Erosion and Land Utilization for Louisiana, by A. H. Meyer; A Uniform Program of Erosion Control for the Southwest.

The main headings of the report of proceedings of the sixth conference are: A Brief Summary of Recent Results of Agronomic Experiments at the Red Plains Soil Erosion Experiment Station, Guthrie, Oklahoma, by H. G. Lewis; A Brief Summary of Engineering Experiments at the Red Plains Soil Erosion Experiment Station, Guthrie, Oklahoma, by H. S. Reisbol; Recent Results of Agronomic Experiments in Soil and Water Conservation at the Soil Erosion Experiment Station, Tyler, Texas, by R. W. Baird; A Summary of the Recent Results of Agronomic Experiments in Soil and Water Conservation at the Blackland Soil Erosion Experiment Station, Temple, Texas, by E. B. Deeter; A Summary of the Recent Results of Engineering Experiments in Soil and Water Conservation at the Blackland Soil Erosion Experiment Station, Temple, Texas, by P. L. Hopkins; Summary of Agronomic Observations and Results on Soil Conservation Projects of the Southwest, by N. E. Winters; Summary of Results of Engineering Experiments on Soil Conservation Projects of the Southwest, by H. O. Hill; Program of the Soil Conservation Service, by H. H. Bennett; Results of Grass Investigation in Connection with Soil Conservation in the Southwest, by B. F. Kiltz; Wind Erosion Control and Its Effects on a Planned Agriculture, by H. H. Finnell; The Relation of Pond and Lake Building to Water Conservation and Flood Prevention, by W. H. McPheters; Pasture Development in Texas, by V. W. Woodman; and The Use of Elevating Graders in Terrace Construction, by Earl A. Cole.

Papers read at the seventh meeting are: Progress of Soil Conservation Work in Region 4, by Louis P. Merrill; The Progress Made in Wind Erosion Control in the Southern High Plains Region, by H. H. Finnell; The Outstanding Experimental Results in Erosion Control at Temple, Tex., by E. B. Deeter; Watershed and Hydrologic Studies, by C. E. Ramser; Progress in the Central Plains Area—Region No. 7, by N. E. Winters; America's Erosion Problems, by H. H. Bennett; Soil and Water Conservation Investigations,

by G. W. Musgrave; Recommendations for Research Relating to the Control of Wind Erosion, by H. V. Geib; Soil and Water Conservation on Land Utilization Projects in Oklahoma and Texas, by Glen Briggs; A Study of Gully Formation and Control in Oklahoma, by Horace J. Harper; The Cost of Terracing with Power Equipment, by Deane G. Carter; The Importance of Vegetative Growth on Erosion Control, by A. E. Aldrons; and Grass and Legume Studies in Connection with Pasture Improvement and Erosion Control at the Red Plains Soil Conservation Experiment Station, by H. M. Elwell.

- SOUTTER, R. E. (483)
PROBLEMS OF WHEAT PRODUCTION. Queensland Agr. Jour. 41: 493-496. May 1934.

Contour drains, as used in the United States are advocated and discussed, with instructions and measurements for their construction. A home-made level is described.

- SPENCER, G. K. (484)
MAN, THE GREAT DESERT MAKER—AREAS ARID FROM IRRIGATION. Baltimore Sun Mag., illus. January 10, 1937.

"Evidence that ancient Indian farmers started some of the seven great western deserts by ignorant forms of agriculture which brought alkali to the soil and killed off plant life, has been found by soils men studying modern problems . . . Alkali—both white and black—leached to the surface by intensive irrigation as long ago as 400 A. D., and perhaps as far back as 1,000 B. C., is believed to have killed off struggling vegetation, leaving the way open for the formation of dunes which could not be controlled." The danger of the alkali problem is discussed, and the experimental work at the California Agricultural Experiment Station described.

- SPILLERS, A. R. (485)
A CORRELATION OF EROSION WITH LAND USE AND SLOPE IN THE NORRIS DAM WATERSHED. Jour. Forestry 34: 492-497, illus. May 1936.

The effect of land use on erosion is pointed out, and charts are presented showing proportion of each slope class in each land-use area, and prevalence of marked erosion in each land-use area as affected by slope. The conclusion is that "about 16 percent of the entire area of the Norris Dam watershed shows marked erosion. The proportion of eroded land on cleared areas is 3½ times as great as it is upon the forest land. The degree of slope has a notable effect on both the extent and severity of erosion on cleared land; under forest cover the effect of slope is almost negligible." The author recommends forest cover as the best and most permanent erosion-control agency upon slopes and states that "artificial erosion work should continue where erosion has already advanced to a serious stage."

- SPILLMAN, W. J. (486)
SOIL CONSERVATION. U. S. Dept. Agr. Farmers' Bull. 406, 15 pp., illus. 1910.

Restoration and maintenance of productive soil are considered as the most important phase of the conservation problem. "We must cease abusing the soil. The renting of land on short leases for the purpose of growing grain for market is one of the surest means of reducing the productive power of the soil." The solution of the problem is believed to lie in more domestic animals on the farm with greater use of leguminous crops and in encouraging farmers to utilize soil-conserving resources at their command.

- SPLICHTNER, F. (487)
VEREINIGTE STAATEN. DIE "SOIL CONSERVATION ACT" ALS GRUNDLAGE EINER AGRARREFORM. Wirtschaftsdienst 21 (20): 697-698. May 15, 1936.

Not examined.

- SPRING, S. N. (488)
FIFTY YEARS OF CONSERVATION. Amer. Forests 41: 355-357, 394, illus. August 1935.

Describes a half century of conservation which began when the legislature of New York State passed an act creating a forest commission and two forest preserves. "The act marked the real beginning of state forestry in the United States . . ."

- STALLINGS, J. H. (489)
COORDINATION STRESSED AT NORTH CAROLINA. The Land, Today and Tomorrow 1: 25-27. November 1934.
The second in a series of articles on the progress of the soil-erosion projects. It describes the work at the two units of the North Carolina soil-erosion project, namely, the Deep River area, consisting of approximately 140,000 acres and the Brown Creek area of about 60,000 acres.
- STAMP, L. D. (490)
NATIONALISM AND LAND UTILIZATION IN BRITAIN. Geogr. Rev. 27: 1-18, illus. January 1937.
- STAPLEDON, R. G. (491)
THE FUTURE OF THE COUNTRYSIDE. V. AGRICULTURE AND THE COUNTRYSIDE. Country Life [London] 79 (2049): 426-428. April 25, 1936.
The author considers agriculture in relation not only to its own prosperity, but to scenery and recreational facilities. He wants, in place of the Forestry Commission, a rough-land utilization commission for England, to deal not only with forestry but also with the reclamation of hill pastures and the recreational aspect of the hills. He also stresses the importance of a soil and vegetation survey as a safeguard against the misappropriation of good farming land.
- THE GREEN HILLS. I.-HILL LAND AND HIGH FARMING. Country Life [London] 79: 22-23, illus. January 4, 1936. (492)
"Two-thirds of Great Britain is wasted in hill grazing and rough pastureland—unproductive agriculturally and largely inaccessible. In two articles based on his remarkable book 'The Land Now and To-Morrow', Professor Stapledon outlines a means of correcting this serious wastage in the national economy. In two sentences, his plan is (1) to double the agricultural population by reclaiming grass, especially hill land; (2) to make these empty spaces available for the health and recreation of the town population. In the following article he speaks with authority as Director of the Welsh Plant Breeding Station, which has worked a revolution in grassland farming."—Ed. Note.
- THE LAND; NOW AND TOMORROW. 336 pp., illus. London, Faber & Faber, Ltd. 1935. (493)
The relation of forestation to soil conservation is treated in chapter VII, Resources: Woodlands, pages 84-93. The value of vegetative covering in erosion control is stressed.
- STEPHENS, P. H. (494)
WHY THE DUST BOWL? Jour. Farm. Econ. 19: 750-757. August 1937.
The author locates the dust bowl and gives historical statistical data on rainfall in this region. He states that farming on the contour has resulted in deeper penetration of rainfall. Expensive terraces are not necessary since inexpensive contour farming and strip cropping are sufficient and more practical.
- STEWART, G., AND FORSLING, C. L. (495)
SURFACE RUN-OFF AND EROSION IN RELATION TO SOIL AND PLANT COVER ON HIGH GRAZING LANDS OF CENTRAL UTAH. Jour. Amer. Soc. Agron. 23: 815-832. October 1931.
"Since 1915, the research branch of the U. S. Forest Service has maintained at the Great Basin Branch Experiment Station, on the Ephraim Canyon watershed of the Manti Forest in central Utah, a detailed study of the relation of vegetative cover and grazing to surface run-off and erosion." Grazing records and summer and winter precipitation are shown by tables, as are also the experiments on eroded and noneroded soils.
- STEWART, GUY R. (496)
SLOWING THE RAINDROPS IN JAVA AND SUMATRA. Soil Conserv. 3: 22-25, 28, illus. July 1937.
After an outline of the geography of the Netherlands Indies, the author discusses such topics as: Topography Unusual; Agricultural Systems Harm-

ful; "Landang" Cultivation; Plantation Havoc; Erosion Prevention Measures; and Experimental Work.

STEWART, P. H.

(497)

AN EXTENSION PROGRAM FOR THE CONTROL OF SOIL EROSION IN NEBRASKA. Jour. Amer. Soc. Agron. 23: 253-258. April 1931.

The transitional zone of Nebraska with its rainfall and other variations presents special and peculiar problems of soil washing, which are treated from three viewpoints: (1) The organic-matter phase, i. e., loss of virgin organic soil qualities necessary for proper tilth, water absorption, and nitrate production; (2) soil-moisture conditions limiting crop production; and (3) gully formation with consequent damage to machinery, land, and land values. An outline is given of Nebraska's erosion-control program, which includes use of legume crops and other methods "such as installing brush and soil-saving dams, terracing, and carrying out definite rotation practices."

— AND WOOD, I. D.

(498)

SOIL WASHING: THE CAUSE AND METHODS OF PREVENTION. Nebr. Agr. Col. Ext. Cir. 123, 35 pp., illus. 1924.

The erosion of Nebraska soils and methods of preventing it are discussed.

STOCKDALE, F. A.

(499)

PREVENTION OF SOIL EROSION DURING REAFFORESTATION IN HILLY SECTIONS OF THE WET TROPICS. Empire Forestry Jour. [London] 7: 41-46, illus. 1928.

"For a considerable time it has been obvious to workers in the Wet Tropics that soil erosion was one of the most serious problems which required solution." Erosion in Jamaica, Ceylon, and the Dutch East Indies and such measures of control as terracing, contour planting, and cover crops are discussed, also loss of soil through tropical or monsoon rains and experiments in soil conservation by rubber and tea growers. Accompanied by literature citations.

(500)

SOIL EROSION. Trop. Agr. [Ceylon] 61: 131-140, September 1923; 87: 92-98. August 1936.

In the earlier article the writer says that the first serious attention given to the problem of soil erosion in Ceylon "was in 1904 when a commission was appointed to enquire into and report on the question of soil denudation in the Kelani Valley, and other districts . . ." Experiments at Peradeniya Experiment Station to test the amount of soil erosion that took place under different systems of cultivation are described. Excerpts from various reports on irrigation and the state of rivers, and on the alienation of the catchment areas of the principal rivers in Ceylon are given. The director of agriculture's final report is given in full. He concludes by saying, "The whole question is bound up in a progressive forest policy."

In the later article the author summarizes efforts made in the British Empire during the past 5 years to deal with the erosion problem. In Ceylon efforts have been made to arouse interest in amount of soil lost since 1873. Determined effort to arouse public and "planting" interest began in 1923. In Tanganyika terracing experiments and antierosion methods have been started, and contour planting is spreading where ridge cultivations have been started. In Nyassaland various measures against soil erosion have been adopted in the cultivations on undulating lands, and for tobacco and cotton lands the establishment of Mangum terraces is becoming general where plowing is practiced. This system is also commonly adopted in Southern Rhodesia. In Basutoland soil erosion is being combated by a number of large shallow reservoirs in which flood waters from the hillsides can be collected. In the Union of South Africa antierosion work consists mainly in making dry stone walls and grass-covered banks along the contours. Overstocking is becoming general in many parts of East Africa and South Africa, and a state of devastation may soon have to be faced in certain areas. In Java it is provided that "forest lands can only be opened in economic crops if adequate contour drains are established and terraces made before planting begins."

- STUART, R. Y. (501)
SOIL EROSION. U. S. Forest Serv. Ann. Rept. 1929, 60 pp. 1929.

The author gives a brief summary of soil-erosion conditions and investigations made by experiment stations, pages 51-52. "Much of the tremendous burden of silt carried by the Mississippi River comes from forest lands or lands which should never have been placed under the plow." Data on flood conditions in the Mississippi Basin are given.

- SUNDERLIN, H. H. (502)
BETTER ANCHORS FOR HILLSIDE FARMS. Wallaces' Farmer 51: 894, illus. June 25, 1926.

The author deals with the problem of erosion and defines two types. (1) Surface erosion and (2) gullying. For the first he advocates the use of terraces and the plowing under of organic matter to render the soil more porous and receptive to water, and for the second brush and woven-wire dams.

- SWAIN, G. F. (503)
CONSERVATION OF WATER BY STORAGE. 384 pp., illus. New Haven, Yale University Press. 1915.

The first chapter is devoted to conservation in general; chapters 2-5 deal with the relation of the conservation of water to the conservation of other resources and discuss the water-power question with reference to Federal control of waters; chapter 6 deals with the technical aspects of water-power development; chapter 7 deals with floods and their prevention. Soil erosion and its prevention by vegetative cover are treated on pages 265-270.

- TAFT, WILLIAM HOWARD. (504)
ADDRESS BEFORE THE NATIONAL CONSERVATION CONFERENCE, KANSAS CITY, MO., SEPT. 25, 1911. Natl. Conserv. Con. Addresses and Proc. 3: 55-62. 1912. [Reprinted as U. S. Dept. Agr. Off. of Sec. Cir. 38, with title "Conservation of the Soil." 1911.]

President Taft spoke with particular reference to the continued production of food in this country sufficient to feed the growing population, better systems of farming and more intense and careful and industrious cultivation, the movement of population from farm to city, the costs of farm production, the losses of soil caused by erosion, and farm organization. Contour farming, rotation crops, and forest protection were mentioned among the best methods of stopping erosion. He stated that it was proposed to organize a force of 3,000 men, one to every county in the United States, to conduct experiments for the edification of farmers, to be paid by the county, State, and Federal Government. The President said in conclusion that he found the agricultural future hopeful and that "we may look forward to the middle of this century, when 200,000,000 of people will swear fealty to the starry flag as a time when America will still continue to feed her millions and feed them well out of her own soil." The acreage of the United States was given as about 1,900,000,000 acres. "About 1,000,000,000 acres is land which is untillable. It is reasonably certain that substantially all the virgin soil of a character to produce crops has been taken up . . . The first great step that has to be taken in reformed agriculture is the conservation of the soil. Under our present system the loss to the farms in this country by the erosion of the soil is hardly to be calculated." Crop rotation, deep cultivation, contour plowing, and afforestation are among the measures recommended for soil conservation.

- (505)
ADDRESS TO THE NATIONAL CONSERVATION CONGRESS IN ST. PAUL, MINN., SEPTEMBER 5, 1910. Cong. Rec. pp. 34-39, December 6, 1910.

"Conservation as an economic and political term has come to mean the preservation of our natural resources for economical use, so as to secure the greatest good to the greatest number." Agricultural lands, minerals, forests, coal, oil and gas, and phosphate lands were the subjects treated.

TAYLOR, E. M.

(506)

AGRICULTURAL VALUE OF NILE SILT HELD FALLACIOUS, SUMMER FALLOW, NOT SILT DEPOSIT, MAINTAINS SOIL FERTILITY, SO NEED NOT OLOG CANALS TO GET SILT TO LAND. Engin. News-Rec. 102: 993-995. June 20, 1929.

Briefly outlines the history of irrigation in Egypt to show that two main changes have taken place: (1) The land is now irrigated instead of inundated and so does not receive the annual deposit of silt from the Nile and (2) the summer fallow has been eliminated from the agricultural system and summer cropping substituted. Shows that the elimination of summer fallow rather than the reduction of silt is the cause of the decline in soil fertility.

TENNESSEE VALLEY AUTHORITY.

(507)

REPORT TO THE CONGRESS ON THE UNIFIED DEVELOPMENT OF THE TENNESSEE RIVER SYSTEM. Tenn. Valley Authority. 105 pp., illus. Washington, Govt. Print. Off. 1936.

This report consists of four parts—schedules, policies, electric power, and constructional operations. Soil erosion and conservation are dealt with in part 2.

(508)

SOIL, THE NATION'S BASIC HERITAGE; A STORY OF THE RESTORATION OF NATURAL WATER CONTROL THROUGH SOIL CONSERVATION AND IMPROVEMENT. Tennessee Valley Authority. 59 pp., illus. Washington, Govt. Print. Off. 1936.

"This booklet attempts to picture what is happening to the country's farm lands in one important region, the Tennessee Valley, and how agricultural forces of the land-grant colleges and universities of the seven Valley States, the United States Department of Agriculture and the Tennessee Valley Authority are encouraging the conservation of soil and the restoration of its fertility."

THOMPSON, J. G.

(509)

THE RISE AND DECLINE OF THE WHEAT GROWING INDUSTRY IN WISCONSIN. Wis. Univ. Bull. 292, 250 pp., illus. 1909.

"The present study is an attempt to describe the development of the wheat industry in Wisconsin, and to arrive at a conclusion as to the cause or causes of its meteoric rise and decline. . . . The one great cause assigned almost universally for the series of crop failures was that of so-called soil exhaustion due to continued and successive cropping to wheat. The present theory as to soil exhaustion strengthens our inclination to believe in the correctness of this opinion" (p. 20).

THROCKMORTON, R. I.

(510)

CROPS, CROPPING SYSTEMS, AND EROSION. Kans. State Bd. Agr. Quart. Rept. 49 (193A): 48-51. 1930.

An address delivered at the Kansas Agricultural Convention in 1930. Terracing alone is not deemed sufficient to cope with the problem of soil erosion in Kansas. The combined use of sod crops, terraces, crop rotation, etc., is recommended.

(511)

EROSION OF KANSAS SOILS. Kan. Bd. Agr. Blen. Rept. (1915-16) 20: 170-178, illus. 1916.

"Erosion of Kansas soils and methods of prevention are discussed, including the terrace method and the earth dam method."—Exp. Sta. Rec. 38: 422. 1918.

TIPTON, A. S.

(512)

CONSERVING FLOOD WATERS IN NEW MEXICO. Irrig. Age 32: 22-23, 27, illus. December 1916.

Describes various irrigation projects and shows how water conservation has been an important factor in the preservation of the soil and in its productivity.

TODD, J. S.

(513)

AMERICAN STUDENT VIEWS CHINESE FARMING. HE FINDS THAT OUR MISCONCEPTION OF CHINA, ITS PEOPLE, AND ITS FARMING METHODS ARE DUPLICATED BY CHINESE MISCONCEPTIONS OF AMERICA. *Hoard's Dairyman* 82: 142, 165, illus. March 10, 1937.

The primitive farming procedure in China is sketched by the author who says "virtually every square inch of ground space that is available is utilized in farming." Dust storms in north China are described as beneficial because valuable loess is blown from the Gobi Desert several hundred miles inland. Terracing and contour farming are also discussed.

TORRANCE, W.

(514)

OBSERVATIONS ON SOIL EROSION. *Union So. Africa Dept. Agr. Bull.* 4, 16 pp., illus. 1919.

"Popular information on soil erosion in South Africa and its prevention by various means, including terracing, is given."—*Expt. Sta. Rec.* 42: 122. 1920.

TSCHUDY, L. C., and FRANCIS, C. J.

(515)

WATER CONSERVATION EROSION CONTROL MEASURES FOR REGION 9. U. S. Soil Conserv. Serv. SCS-EP-5, 38 pp., illus. July 1936. [Mimeographed.]

Embodies the results of studies on small-dam construction, flood irrigation, graded terraces, water-conservation terraces, contour furrows, and pasture terraces. The instructions are deemed necessary for a more complete erosion-control program to be used on the Soil Conservation Service project areas and the Soil Conservation Service-Erosion Conservation Work camps.

TUGWELL, R. G.

(516)

THE BATTLE FOR DEMOCRACY. 330 pp. New York, Columbia University Press. 1935.

The author discusses the work of various Government agricultural agencies, pages 105-123. He reviews the soil erosion problem, its cost to the country, and the cooperative control measures necessary to its solution, pages 171-177.

(517)

RESETTLING AMERICA: A VAST LAND PROGRAM. *N. Y. Times*, Sect. 8, p. 1, illus. January 14, 1934.

"Through the Surplus Relief Corporation there has been lately appropriated a fund of \$25,000,000 for the selective retirement of marginal land, not piecemeal, patch by patch, but by whole farms, tracts and areas. This is our first definite step in the new direction of long-time land adjustments throughout the country . . . For reasons wholly practical, our present trend in acreage adjustments is from cultivated crops to meadows, lawns and pastures, and the steps we are taking to prevent erosion will tend to clear our running waters and our lakes." The opening of new frontiers outside the city should give access to the soil to all citizens so that they may live in peace and security in their own homes in the country if they so desire.

TURNER, A. W.

(518)

SAVING OUR SOIL. *Wallaces' Farmer* 44: 1615, illus. August 22, 1919.

An affirmation of the fact that about one-seventh of the land in Iowa, Nebraska, Missouri, Illinois, and Indiana is affected by erosion. Soil management is necessary in the form of contour plowing, brush dams for gully washing, as well as earth and concrete dams. A construction method for brush and tile dams which proved successful in Iowa is described and illustrated.

UHLAND, R. E.

(519)

SOIL CONSERVATION PRACTICES. U. S. Soil Conserv. Serv. Handbook. 179 pp. 1936. [Mimeographed.]

"The material contained in this handbook has been prepared for the use of personnel on Soil Conservation Service demonstration areas and outlying Emergency Conservation Work erosion-control camps in Missouri and Iowa. An attempt has been made to bring together in this publication the latest information available for the planning and execution of a coordinated erosion-control program."

UHLAND, R. E.

(520)

UPPER MISSISSIPPI VALLEY REGION, ANNUAL REPORT I. U. S. Soil Conserv. Serv.
SCS R5-MS-2, 65 pp., illus. 1936.

This report covers in detail the following subjects: (1) Description of region, soils, climate, agriculture, character and extent of erosion, problems in soil conservation, and proper land use for the region; (2) research (containing a summary of run-off and erosion-control data compiled at the Bethany, Clarinda, and La Crosse stations); (3) operations in agronomy, erosion-control practices, nurseries, and special surveys; (4) cooperative relations, which lists various Federal and State agencies engaged in soil conservation and its related subjects; and (5) a detailed summary in tabular form of soil-conservation work and research completed to July 1, 1936, in the States of Illinois, Iowa, Minnesota, Missouri, and Wisconsin.

UNION OF SOUTH AFRICA DEPARTMENT OF AGRICULTURE AND FORESTRY.

(521)

ANNUAL REPORT OF THE SECRETARY OF AGRICULTURE AND FORESTRY . . . 1936.
pp. 493-618. 1936.

The subjects of soil-erosion control, drift sands, pasture research and veld management, and protection of catchment areas are discussed, pages 498-501. Three schemes, involving government and state cooperation, are outlined under "Soil-Erosion Control."

UNITED STATES AGRICULTURAL ADJUSTMENT ADMINISTRATION.

(522)

U. S. AGRICULTURAL CONSERVATION: A NATIONAL FARM POLICY. A. A. A. Gen. Inform. Series G-62, 8 pp., illus. December 30, 1936.

In a discussion of the nature of much-needed farm policies, various factors necessary to a furtherance of soil conservation on a national basis are outlined. The scope of existing laws under the Soil Conservation and Domestic Allotment Act are enumerated, and a general discussion on soil conservation is given.

(523)

IS SOIL CONSERVATION THE ANSWER TO THE FARM PROBLEM? U. S. Agr. Adjustment Admin. C. D. P. 1; 14 pp. Washington, Govt. Print. Off. 1936.

A discussion in two parts. Part I entitled "Soil Losses and Their Causes," considers the seriousness of soil erosion and proves that farmers can not handle the problem unaided. Part II, entitled "Is the Government Justified in Helping Farmers Save the Soil," deals with the history of erosion and discusses the scope of future soil conservation programs.

(524)

SAVING THE SOIL; WHAT IT MEANS TO FARMERS AND THE NATION. U. S. Agr. Adjustment Admin. G-53, 8 pp. Washington, Govt. Print. Off. 1936.

Shows the extent of soil erosion damage in the United States and stresses the need of Nation-wide control and research. The significance of the problem to the individual farmer is indicated and the soil conservation program outlined.

(525)

SOIL CONSERVATION—ITS PLACE IN NATIONAL AGRICULTURAL POLICY. U. S. Agr. Adjustment Admin. G-54, 27 pp. [Washington, D. C.] 1936.

"The present pamphlet is an effort to meet a long-felt need for a clear exposition of the more important economic aspects of the soil-conservation problem and their relations to other elements of national agricultural and industrial policy."

(526)

SOIL HEALTH AND NATIONAL WEALTH. U. S. Dept. Agr. 35 pp. 1936.
[Mimeographed.]

Points out the benefits brought to farm lands through the A. A. A. program. Among other topics discussed are farm security through a knowledge of better farming, methods of preventing soil erosion, and of conserving water.

- UNITED STATES AGRICULTURAL ADJUSTMENT ADMINISTRATION. (527)
 WHAT KIND OF AGRICULTURAL POLICY IS NECESSARY TO SAVE OUR SOIL? U. S. Agr. Adjust. Admin. DS7: 14 pp., illus. 1936.
 Presents a résumé of the soil-erosion problem in the United States and what it means to the individual farmer. Control policies are discussed.
- UNITED STATES BUREAU OF AGRICULTURAL ENGINEERING. (528)
 PRINCIPLES OF SOIL EROSION CONTROL. U. S. Bur. Agr. Engin. 5 pp., illus. 1933. [Mimeographed.]
 Indicates briefly the causes of water erosion and discusses terracing practices as a control measure. Cover crops and crop rotations are also recommended.
- UNITED STATES BUREAU OF CHEMISTRY AND SOILS. (529)
 SOIL EROSION. U. S. Bur. Chem. and Soils Rept. 1933: 7. 1933.
 Emphasizes the value of thick-growing vegetation in erosion control and shows that the results of investigations conducted by the Bureau's 10 erosion stations indicate that certain soil types are more susceptible to washing than are others. Corn cropping is cited as a most destructive factor in soil washing.
- SOIL EROSION INVESTIGATIONS. U. S. Bur. Chem. and Soils Ann. Rept. 1931: 41-45; 1932: 25-28. (530)
 The 1931 report mentions addition of three experiment stations located in Washington, North Carolina, and Iowa. The work at five previously established stations is summed up. Among the results are data based on quantitative measurements of soil and water losses; the effectiveness of graded terraces; construction of low-cost dams for gullies by the use of old fertilizer sacks filled with soil and bluegrass roots; the use of forest litter and leafmold. The results of a reconnaissance erosion survey of the Brazos River, Tex., discloses that floods there "probably can never be adequately controlled until a far-reaching effective system of soil and water conservation is put into operation over the drainage basin." Extensive field work by the Bureau has demonstrated that the topsoil of most farm lands is not so deep as generally has been supposed. A new conception of land values is being brought to the attention of farmers as the result of experiments. "Since the formulation of a definite plan for a national program of research on basic principles of soil-erosion processes and on methods of erosion control . . . much has been accomplished in (1) arousing farmers and agricultural specialists of the Nation to a realization of the cost of this form of continuous land depreciation and (2) in starting practical methods of slowing down the wastage in regions where previously practically nothing was being done" (1932 Rept.). Accomplishments resulting from the application of these practical methods is given in the 1932 report.
- UNITED STATES COMMITTEE ON THE CONSERVATION AND ADMINISTRATION OF THE PUBLIC DOMAIN. (531)
 REPORT . . . JANUARY 1931. Transmitted to the President of the United States in pursuance of the act of April 10, 1930. 85 pp., illus. 1931.
 Includes the general and special recommendations of the committee and discussion of the following topics: The present vacant, unreserved, unappropriated public lands, the homestead laws, grazing, reclamation, national forests, public parks and monuments, clear listing of nonmineral grants to the States, flood control, conservation, erosion, restrictions on State land grants and their result, stock driveways, agricultural and range experiment stations, migratory-bird refuges, and Federal-aid roads.
- UNITED STATES CONGRESS, HOUSE COMMITTEE ON AGRICULTURE. (532)
 TO CONSERVE RUN-OFF OR FLOOD WATERS. CONSIDERATION OF WILD-LIFE CONSERVATION. Hearing . . . 71st Cong., 3d sess., [H. R. 16657] 57 pp. February 6 and 13, 1931 (Serial Y).
 A statement by S. H. McCrory on soil erosion appears on page 55.

UNITED STATES CONGRESS, HOUSE COMMITTEE ON APPROPRIATIONS. (533)
 HEARING . . . ON H. R. 11418. 74th Cong., 2d sess., 1340 pp. Washington,
 Govt. Print. Off. 1936.

On pages 818-929 the Soil Conservation Service hearings are given verbatim. Various phases of the Service and its program are discussed. Erosion control in foreign countries is also considered. Considerable data are given on erosion research at the various agricultural experiment stations.

SOIL EROSION RESEARCH. Hearing . . . on Agr. Dept. Approp. Bill for 1936, 74th Cong., 1st sess., pp. 360-361. February 1, 1935. (534)

In a statement by Dr. Knight, soil erosion research is shown to be of very great importance. The water-conservation phase of the program is stressed. "The control of soil and water losses still centers largely in the erosion experiment stations located in 10 of the most seriously affected type areas of the country . . . Fundamental research on the problem of soil erosion continues as the function of the Department of Agriculture and is being actively and aggressively carried on."

UNITED STATES DEPARTMENT OF AGRICULTURE. (535)
 CLASSIFIED LIST OF PROJECTS OF THE AGRICULTURAL EXPERIMENT STATION, 1930.
 U. S. Dept. Agr. Misc. Pub. 89, 252 pp. 1930.

"This classified list of projects includes 7,019 State experiment station projects and 188 insular station projects active during the fiscal year 1930. Of the total number of State experiment station projects, 410 were supported by the Adams fund and 1221 by the Purnell fund." A list of soil-erosion stations is given, page 35.

CONSERVATION OF SOIL RESOURCES. U. S. Dept. Agr. Farmers' Bull. 342: 5-10. 1909. (536)

This article, compiled from bulletins issued by the experiment stations of Alabama, Mississippi, South Carolina, Tennessee, and Wisconsin deals with the prevention of soil washing, soil drifting, increasing the water-holding power of the soil, the preservation of wooded belts in north and south strips, and the planting of windbreaks.

REPORT OF THE SECRETARY. U. S. Dept. Agr. 115 pp. Washington, Govt. Print. Off. 1936. (537)

The following subjects are covered, pp. 18-25: Methods of Erosion Control; Soil Losses in 1936; Soil Conservation Associations; Land Use and Flood Control; and Land Policy. "The demonstration projects accomplish three distinct purposes: They test various methods of erosion control, provide demonstrations of the appropriate methods, and actually prevent erosion on the particular lands involved."

SOIL EROSION AND FARM HOUSING INVESTIGATIONS. U. S. Dept. Agr. Rept. of Sec., pp. 101-102, 103-105. 1934. (538)

"Tests at the erosion experiment farms on terracing, supplemented by contour plowing and the use of soil-saving and soil-building crops, as the most effective means of controlling soil erosion on cultivated land, and data from the farm housing survey conducted in cooperation with the agricultural colleges and experiment stations in 46 states are briefly noted."—Expt. Sta. Rec. 72: 700. 1935.

WASHED SOILS; HOW TO PREVENT AND RECLAIM THEM. U. S. Dept. Agr. Farmers' Bull. 20, 22 pp., illus. 1894. (539)

"The nature and extent of water erosion of agricultural lands are popularly discussed, and the action of organic matter, humus, and lime in the soil in reducing washing is explained. The means described for preventing washing and for reclaiming gullied lands are deep plowing to increase absorptive power of soils, underdrainage, hillside ditches, terracing, reforestation, and covering with grasses or similar vegetation."—Expt. Sta. Rec. 6: 515. 1894-95.

- UNITED STATES DEPARTMENT OF AGRICULTURE EXTENSION SERVICE. (540)
 LOST: MILLIONS OF DOLLARS. U. S. Ext. Serv. Rev. 6: 68, 80, illus. June 1935.

"Soil erosion is a serious problem on 75 percent of the land area of Ohio. The damage amounts to millions of dollars." Extension Service activities and the value of results are presented.

- UNITED STATES EMERGENCY CONSERVATION WORK. (541)
 SUMMARY REPORT OF THE DIRECTOR . . . ON THE OPERATIONS OF EMERGENCY CONSERVATION WORK FOR THE PERIOD EXTENDING FROM APRIL 1933 TO JUNE 30, 1935. 79 pp. Washington, Govt. Print. Off. 1935.

Participation of the Department of Agriculture in emergency conservation work is taken up, pages 39-45. The following is quoted from this section: "In addition to forest protection and development there was the growing need of soil-erosion and flood control, which the Department's representatives had long recognized as scourges to the Nation. Emergency Conservation Work gave the Department the unusual opportunity to attack this problem by the assigning of 123 CCC camps to erosion and flood control in 18 states."

- TWO YEARS OF EMERGENCY CONSERVATION WORK—APRIL 5, 1933—MARCH 31, 1935. U. S. Emergency Conservation Work. 54 pp. Washington, D. C. April 5, 1935. [Mimeographed.] (542)

In addition to a report by the Director, reports covering the C. C. C. activities of the Departments of War, Interior, Agriculture, and Labor, and the Veterans' Administration are included. In the report for the Department of Agriculture, some of the outstanding accomplishments of the C. C. C. are given, grouped under seven broad headings, one of which is Soil Erosion and Flood Control. "The soil erosion and reforestation work done by the nineteen CCC camps for the Tennessee Valley Authority is in a class by itself. Here 86,503 dams of various types have been built and work completed so far is benefiting 171,000 acres. The major objective at first has been to prevent erosion which would dump gravel and silt into the reservoir being created by the Norris Dam."

- UNITED STATES FEDERAL EMERGENCY ADMINISTRATION OF PUBLIC WORKS, MISSISSIPPI VALLEY COMMITTEE. (543)

REPORT OF THE MISSISSIPPI VALLEY COMMITTEE OF THE PUBLIC WORKS ADMINISTRATION. 2 vs., illus. Washington, Govt. Print. Off. 1934.

This report on flood control, navigation, power and water supply, irrigation, forestry, conservation, and related subjects gives an outline of soil-erosion conditions in the Mississippi Basin, volume 1, pages 70-76; discusses the nature of erosion, the difficulty of solution when the problem of individual land ownership is brought into consideration, public activities control, basic principles of policy, and a national program. Precipitation and run-off, ground water, and the origin, nature, and consequences of erosion are described, volume 1, pages 107-130. The upper Mississippi Basin is considered in relation to the problems of erosion, local floods, drainage restoration and reconstruction, forests, and game refuges, volume 2, pages 131-222.

- UNITED STATES FOREST SERVICE. (544)
 EROSION-STREAM-FLOW INVESTIGATIONS. U. S. Forest Serv. Rept. 1933: 38-39. 1933.

"The Civilian Conservation Corps has 97 erosion-control camps on national-forest lands and 104 erosion-control and 20 flood-control camps on State and private lands. The main purpose of this work is to restore forest or other cover where its depletion has been the cause of accelerated erosion or excessive run-off and to supplement this plant cover by check dams or other engineering works to retard water flow and to aid in holding soil . . ." The work of several forest experiment stations in the field of erosion control is outlined.

UNITED STATES GREAT PLAINS COMMITTEE. (545)
THE FUTURE OF THE GREAT PLAINS. Report . . . 194 pp., illus. Washington,
Govt. Print. Off. 1936.

"In 1934 and again in 1936 drought conditions in the Great Plains area of the United States became so severe that it was necessary for the Federal Government to take emergency steps . . . The experience of the two tragic years made it evident that the drought had merely accentuated a situation which had been long developing . . . These factors led to the creation of the Great Plains Drought Committee, which rendered a preliminary report last August; and to the appointment by the President of the Great Plains Committee, whose further studies are summarized and recommendations submitted in the present report." Among the topics discussed are the following: Use and Misuse of Land and Waters; Overstocking of Range Lands; Soil Wastage and Water Loss; A Program of Readjustment and Development, Including Lines of Federal and State Action. Supplements include memoranda on legal problems of soil erosion and grazing control; appendices include soil and water conservation in the Great Plains; a standard State soil conservation districts law; and a summary of the Texas legislation on soil-erosion control.

UNITED STATES OFFICE OF EXPERIMENT STATIONS. (546)
REPORT ON THE AGRICULTURAL EXPERIMENT STATIONS, 1935. 160 pp. Washing-
ton, Govt. Print. Off. 1936.

On pages 14-16 land use and conservation are discussed and specific examples given of recent work of experiment stations as follows: Kansas—"Recommendations for conserving soil moisture and maintaining a more diversified and stable type of agriculture in regions of 15 to 25 inches of rainfall . . . an increase of organic matter in the soils, and maintenance of grass or other plant cover, especially use of perennial grasses and legumes to prevent wind erosion." Oklahoma—"Attention is called particularly to the efficiency of alfalfa planted on the contours in reducing the run-off and loss of soil from cotton fields even with a rainfall of 1.56 inches in a single day." Agricultural Engineering, pages 140-143. The section on page 140 dealing with snow-cover irrigation-water resources shows that flood prevention and control and the conservation of snow run-off for irrigation purposes are now becoming specialized features of snow surveying. Outstanding accomplishments of the Nevada and Utah stations are reported.

UNITED STATES PUBLIC WORKS ADMINISTRATION, MISSISSIPPI (547)
VALLEY COMMITTEE.

REPORT OF THE MISSISSIPPI VALLEY COMMITTEE OF THE PUBLIC WORKS ADMINIS-
TRATION. 234 pp., illus. Washington, Govt. Print. Off. 1934.

This report on principles, policies, conditions, and problems of the use and control of water in the Mississippi drainage area discusses erosion-control policies pages 61-66, outlining erosion conditions in the area, and proposing a coordinated control program involving Federal, State, and private co-operation. There is also a description of the nature of soil erosion, rainfall, vegetative cover, and siltation, pages 119-123. Control methods are briefly outlined.

UNITED STATES RESETTLEMENT ADMINISTRATION. (548)
AMERICA'S LAND. U. S. Resettlement Admin. 31 pp. 1936.

"The purpose of this booklet is to describe what one governmental agency, the Resettlement Administration, is doing to preserve the riches of America's land for the America that is to come." The ravages of soil washing, wind erosion, and floods are described, and the program of the Resettlement Administration in soil conservation is discussed.

UNITED STATES SOIL CONSERVATION SERVICE. (549)
ANCHORING FARMLANDS IN THE OHIO VALLEY REGION. 19 pp., illus. Washing-
ton, Govt. Print. Off. 1937.

"If the United States is to remain a productive agricultural Nation we must 'anchor' our soil and protect it against the ravages of rain and wind. Already we have lost untold billions of tons from millions of acres. The task that lies before us is to check the further advance of erosion and carefully conserve the abundant supply of fertile soil that remains. The

pages that follow tell the story of soil in the Ohio Valley Region. They show what happens to farmlands treated carelessly and offer, as an alternative, practical measures for soil protection in this rich agricultural section."

UNITED STATES SOIL CONSERVATION SERVICE.

(550)

ANNUAL REPORT PACIFIC NORTHWEST EROSION CONTROL PROJECTS—1934-35.

U. S. Soil Conserv. Serv. SCS-AR-1, 44 pp., illus. 1936. [Mimeographed.]

This report presents the results of studies conducted at two erosion-control projects, the Palouse project in southeastern Washington and northwestern Idaho, and the Wildhorse project in northeastern Oregon.

(551)

DOLLARS ARE SAVED, AS SOILS ARE SAVED, IN 12 NORTHEASTERN STATES. Soil Conserv. 2: 168-173, illus. February 1937.

"Projects throughout the United States prove not only that erosion can be controlled but that it is possible for the average farmer himself to undertake the conservation of . . . the soil." Discusses C. C. C. cooperation.

(552)

EROSION CONTROL IN THE NORTHEAST. 18 pp., illus. Washington, Govt. Print. Off.

"This pamphlet was prepared to furnish a general picture of the soil-conservation problem in the northeastern section of the United States." Consists of photographs which depict the ravages of erosion and floods and show the advantages of control practices such as forestation, vegetative cover, strip cropping, terracing, and check dams.

(553)

LOST! TONS OF FERTILE CALIFORNIA SOIL. U. S. Soil Conserv. Serv. 16 pp., illus. 1935.

This pamphlet describes the different types of erosion and discusses the work of the Soil Conservation Service in California.

(554)

OUR SOIL: ITS WASTAGE, ITS PRESERVATION. 21 pp., illus. Washington, Govt. Print. Off. 1936.

Information on the subject of soil erosion in Region 7. Examples of gullies, tillage, wind erosion, and native vegetation are illustrated.

(555)

PROCEEDINGS AND RECOMMENDATIONS FEBRUARY CONFERENCE SOIL EROSION SERVICE AND E. C. W. WORKERS, OKLAHOMA CITY, OKLA., FEBRUARY 5, 6, 7, 1935. 2 vs., 219 pp. 1935. [Mimeographed.]

In v. 1 a general discussion is given on gully control, terrace design and construction, terrace outlet designs, and drafting, mapping and photogrammetry. Contents of volume 2: Gully Control Measures of the Southwest, by John G. Bamesberger; Gully Control as Related to the Illinois Project and the Middlewest, by M. E. Ensminger; Gully Control in the Southeast, by J. T. McAlister; Terracing in the South, by E. R. Raney; Terracing Problems in the North Central States, by G. E. Ryerson; Terracing Construction with Large Equipment Units, by John S. Glass; Engineering Phases on the Navajo Project, by F. D. Matthews; relation of E. C. W. Camps to Soil Conservation Service, by J. G. Lindley; Practical Photogrammetry, by E. A. Schuch; Diagrams for Use in Hydraulic Design of Erosion Control Measures, by H. L. Cook; Standard Methods of Making Reproductions From Drawings and Tracings, W. F. Beamon; The Collection of Rainfall and Other Hydrological Data on the Soil Conservation Project, by D. B. Krimgold; and Preliminary Results on Terracing Collected at the Soil Erosion Experiment Station, by C. E. Ramser.

(556)

REPORT OF THE CHIEF . . . 1935, 1936. U. S. Soil Conserv. Service, Washington, Govt. Print. Off. 1935-36.

The 1935 report presents data on the soil-erosion problem in 1935. Considerable data are given on the progress of the various soil-erosion projects throughout the country. The nature and procedure regarding cooperative agreements for demonstrational and experimental work in erosion control

is explained. Erosion-control methods are discussed generally. The 1936 report covers Soil Conservation Service activities during 1936.

UNITED STATES SOIL CONSERVATION SERVICE.

(557)

RÉSUMÉ OF ACTIVITIES OF THE SOIL CONSERVATION SERVICE UNDER THE DEPARTMENT OF THE INTERIOR. 25 pp. May 1935. [Mimeographed.]

Table of contents: Procedure on Demonstration Projects; Origin of Control Measures Used; The Training of Personnel; Summary of Financial Status; Appraisal of Results Obtained Through the Program of the Soil Erosion Service Under the Department of the Interior; Tabular Summary of work Completed by the Soil Conservation Service Under the Department of Agriculture; Plan for 1935-37; Erosion Control Projects; Erosion Experiment Stations; The Long-range Program of the Soil Conservation Service; Benefits To Be Obtained From an Adequate Program of Erosion Control.

(558)

SOIL AND WATER. U. S. Soil Conserv. Serv., Div. Ed.-Inform. 174 pp., illus. 1936. [Mimeographed.]

"In the following pages an attempt is made to give an outline of the fundamental problems involved in undertaking and carrying out a program of soil conservation in the Southwest." Table of contents: The Erosion Problem; The Southwest Region; Soil Conservation Service; Water Erosion; Wind Erosion; Climatic Conditions; Soils; Vegetation; Man-Induced Erosion; Floods; Silt; Dust Storms; Interrelation of Watershed Use; Revegetation; Range Management; Forest Management; Farm Management; Wildlife Control; Water Conservation; Flood Control; and Plans and Surveys.

(559)

SOIL AND WATER: A DISCUSSION OF THE BASIC PRINCIPLES OF SOIL CONSERVATION IN THE SOUTHWEST REGION. Soil Conserv. Serv. [Albuquerque, N. Mex.] 174 pp., illus. 1936. [Mimeographed.]

Outlines problems involved in undertaking and carrying out a soil conservation program in the Southwest. Contents: The Erosion Problem; The Southwest Region; Soil Conservation Service; Water Erosion; Wind Erosion; Climatic Conditions; Soils; Vegetation; Man-Induced Erosion; Floods; Silt; Dust Storms; Interrelation of Watershed Use; Revegetation; Range Management; Forest Management; Farm Management; Wildlife Control; Water Conservation; Flood Control; and Plans and Surveys.

(560)

SOIL AND WATER CONSERVATION IN THE NORTHERN GREAT PLAINS. Soil Conserv. Serv. 19 pp., illus. Washington, Govt. Print. Off. 1937.

"It is the purpose of this booklet to analyze and explain the forces of erosion and to describe and depict the conservation farming practices which the Service is using in its demonstration areas in the northern Great Plains region."

(561)

SOIL AND WATER CONSERVATION IN THE PACIFIC NORTHWEST. 5 pp., illus. Washington. Govt. Print. Off. 1936.

This article discusses the encroachment of soil erosion in the region lying between the Rockies and the Cascades. Overgrazing and forest denudation are cited as the main contributing factors. The Soil Conservation Service program for the region is described.

(562)

TEN BILLION LITTLE DAMS. U. S. Soil Conserv. Serv. 17 pp., illus. Washington, Govt. Print. Off. 1936.

Describes erosional devastation and suggested preventive measures.

(563)

TOPSOIL, ITS PRESERVATION. (S. C. S. Region 5): 22 pp., illus. Washington, Govt. Print. Off. 1937.

This pamphlet shows the causes and extent of damage due to destructive erosion, and what is being done to conserve soil and water.

UNITED STATES SOIL EROSION SERVICE.

(564)

BRIEF OUTLINE OF PROJECTS UNDERWAY AND THE PROBLEM OF SOIL EROSION AND ITS CONTROL. 9 pp. (Washington, D. C.) 1934. [Mimeographed.]

This pamphlet describes the inception of the first large soil-erosion-control projects in the United States and outlines their objectives.

(565)

FIGHT AGAINST EROSION, GREATEST ENEMY OF THE SOIL. Soil Erosion Serv. 8 pp. [1934.]

Describes the different types of soil erosion and recommends practical methods of control.

(566)

SOIL EROSION CONTROL AND LAND-USE PROGRAM, DEEP RIVER AND REEDY FORK PROJECTS. [High Point, N. C.] 32 pp., illus. Reprint December 10, 1934.

This handbook is intended especially for the use of landowners residing in Forsyth, Guilford, and Randolph Counties, N. C. It describes the soils, gully control, terracing practices and construction, and contour cultivation on the Deep River and Reedy Fork projects.

(567)

WATER AND SOIL EROSION. 73d Cong., 2d sess., House Doc. 395: 34-47, illus. 1934.

Defines the soil-erosion problem for the United States as a whole and proposes a working plan for erosion prevention, reduction of run-off, prevention of silting in channels and reservoirs, and protection of valley lands from overwash of infertile erosional debris.

UNIVERSITY OF PRETORIA.

(568)

PROGRESS REPORT ON SOIL EROSION AND GRASSLAND EXPERIMENTS. Issued by Grassland Research Com. Faculty of Agr. [107 pp.], illus. 1936. [Mimeographed.]

Presents the results of experiments on run-off and erosion, fertilization, cultivation of various grasses, grazing, and plant studies.

UPSTREAM ENGINEERING CONFERENCE.

(569)

HEADWATERS CONTROL AND USE. 261 pp., illus. Washington, Govt. Print. Off. 1937.

The conference was held in Washington, D. C., September 22-23, 1936.

A summary of fundamental principles and their application in the conservation and utilization of waters and soils throughout headwater areas, published by the United States Soil Conservation Service and Forest Service, with the cooperation of the Rural Electrification Administration. Contents: Basic Principles of Water Behavior, by Thorndike Saville; Surface Run-Off Control, by Robert E. Horton; Giving Areal Significance to Hydrologic Research on Small Areas, by Merrill Bernard; Influence of Vegetation on Land-Water Relationships, by Isaiah Bowman; Management and Use of Forest and Range Lands, by Earle H. Clapp; Management and Use of Agricultural Lands, Including Farm Woods and Pastures, by H. H. Bennett; Control and Use of Small Streams, by George D. Clyde; Special Aspects of Application; Conserving Wildlife; Physical and Functional Relationships, by Morris L. Cooke; The Comprehensive Engineering Point of View, by Sherman M. Woodward; Big Waters and Little Waters, by Edward M. Markham; Control and Use of Little Waters in France, by Albert Magnein; Building Toward a Permanent Agriculture, by Jacob G. Lipman; On Behalf of a Continent, by Maury Maverick; and The Human Value in Upstream Engineering, by Charles H. Whitaker. The report is concluded with the following appendices: The President's Letter of Instructions; The Committee's Letter of Submittal; General Committees and Cooperating Agencies of the Upstream Engineering Conference; The Supplementary Young Men's Conference; Bibliographies and Technical Journals for Professional Readers; and Selected Bibliography for Non-Professional Readers.

VAN CLEAVE, H. J.

(570)

MAN MEDDLES WITH NATURE. Sci. Monthly 40: 339-348. April 1935.

"He views the results in terms of conquest of the wilderness and boasts of the advance of his civilization, but many of the things that he has

done may be branded as flagrant destruction of an unintelligent meddling with the affairs of nature." The disappearance of wildlife with the accompanying changes in vegetation and deforestation are discussed. "Meddling, even that growing art of the best of intentions, must be replaced by intelligent understanding and actions before conservation may become a reality."

VAN HISE, CHAS. RICHARD.

(571)

THE CONSERVATION OF NATURAL RESOURCES IN THE UNITED STATES. 413 pp. illus. New York, MacMillan Co. 1910. (Revised 1936.)

Consists of 20 lectures given at the University of Wisconsin. It gives the history of the conservation movement and covers the subjects of minerals, waters, forests, soils, and soil erosion in the United States. The relation of the subject to the people at large is also discussed. "An expert in each of the four fields, namely the minerals, the waters, the forests, the lands, have undertaken the revision of that portion of the book. A section on the conservation of wild life has been added that did not appear in the original edition" (1936 edition).

VERMONT AGRICULTURAL EXPERIMENT STATION.

(572)

SOIL DETERIORATION AND SOIL HUMUS. *Vt. Agr. Expt. Sta. Bull.* 135 pp., 142-177. 1908.

"It is a settled policy at this station yearly to 'feature' some special topic in its main annual fertilizer bulletin." Discusses in detail causes and remedies of soil deterioration and methods of renovation. Eight causes of deterioration are cited, and three prime remedies suggested (1) crop rotations, (2) use of farm manures, and (3) green manuring.

VILJOEN, P. R.

(573)

SOIL EROSION. *Farming in So. Africa* 9: 494-495. December 1934.

Discusses the need for combating soil erosion on a national scale. Financial assistance by the State toward preventing erosion is also reviewed.

VISHER, S. S.

(574)

INDIANA REGIONAL CONTRASTS IN SOIL EROSION AND THEIR CHIEF CAUSES. *Ind. Acad. Sci. Proc.* 46: 143-159, illus. 1937.

Cartographic analysis of erosional contrasts and factors that have contributed to their cause. Ten small maps depict percentages by counties of various types of erosion and gullying.

(575)

REDUCTION OF SOIL EROSION ON INDIANA HILLSIDES DECLARED AN URGENT PROBLEM. ABUNDANT RAINFALL IN COOLER MONTHS AND TYPE OF CROPS CREATES RELATIVELY RAPID WASHING AWAY OF FERTILE FIELDS. *Outdoor Ind.* 4: 20-21, illus. May 1937.

"Legislation to encourage the growing of woods or grass on hillsides is highly desirable. At the last session a bill was introduced by the Conservation Department providing benefit payments for the use of hillsides so as to conserve their precious soil. Hillsides devoted to forests would receive benefit payments equal to from three-fourths to four-fifths of the taxes levied against the land. Hillsides devoted to grass would receive benefit payments of half the taxes. This bill got caught in the legislative jam, but a similar bill will be introduced early in the next session." Includes map of Indiana showing the various percentages of areas having considerable sheet erosion and gullying.

VON TREBRA, R. L.

(576)

WORK GOES ON AT ALBION. *The Land, Today and Tomorrow* 1: 11-13. October 1934.

"This is the first of a series of articles describing the various [soil erosion] projects and their problems. In this article by Regional Director R. L. von Trebra, an optimistic note for the future is sounded."—Ed. Note.

VORSE, M. H.

(577)

OUR LAND. *Good Housekeeping* 101: 38-39, 119-122, illus. July 1935.

"Our land is not 'the one immutable, unchangeable, permanent resource that we have loved to think it.' It can be destroyed and dissipated like coal, gas, and petroleum." The results of erosion in China, Africa, and

Asia are compared with the growing results of erosion in the United States. An account is given of Soil Erosion Service work on a farm in South Carolina that saved and restored it to fertility.

- WAD, Y. D., AND TAMBE, G. C. (578)
NOTE ON EROSION IN BLACK COTTON SOILS. Agr. and Live Stock. India 3:
238-245, illus. May 1933.

"Black cotton soil like others of similar physical and chemical nature is highly erodible." The authors quote H. H. Bennett. This paper deals with soil erosion in central India. The various forms and stages of erosion are described, also results obtained from experiments at the research station at Indore. The existing data on factors that influence erosion, useful suggestions for soil erosion control based on these data are presented.

- WALLACE, H. A. (579)
HOW SHALL SOIL CONSERVATION AFFECT THE TOBACCO PLANTER? Tobacco 102:
9-10. April 2, 1936.

Presents the 11 salient points of the new soil conservation program, with summaries of the main features of the immediate program for 1936, e. g., soil-depleting bases to be established on farms to provide a definite standard of improvement measurement; soil-building payments for 1936 seedlings of soil-building crops on cropland; soil-conserving payments at a specified rate for the shifting of acreage from soil-depleting to soil-conserving crops; the establishment of 5 regional administrative divisions in the United States; a general classification of crops into soil-depleting, soil-conserving, and soil-building crops, the division of payments in the southern division between landlords, share tenants, and share croppers; and the organization of the soil conservation program in States and counties through State committees, county associations, county and community committees, and the Extension Service of the land-grant college.

- (580)
NATIONAL FARM PROGRAM. Amer. Fert. 86: 12. January 9, 1937.

Excerpts from a speech. Discusses the provision of the Soil Conservation and Domestic Allotment Act requiring that administration of the agricultural conservation program be transferred to the States by January 1, 1938.

- (581)
THE NEW SOIL CONSERVATION PROGRAM. Amer. Fert. 84: 9, 26. April 4, 1936.

Tells how the program will affect the individual farmer who enters into a contract with the Soil Conservation Service.

- (582)
NEW VISTAS FOR AGRICULTURE. N. Y. Times Mag. pp. 4-5, 18. March 29, 1936.

Discusses the Soil Conservation and Domestic Allotment Act and outlines its objectives and stresses the importance of individual farmer cooperation.

- (583)
REPORT OF THE SECRETARY . . . U. S. Dept. Agr. Yearbook 1936: 1-117, illus. 1936

Discusses soil conservation under the following headings (pp. 59-62): Physical Aspects of the Present Crisis; Types of Erosion; An Erosion Survey; and Practical Control Measures.

- (584)
RESEARCH—THE YEAST IN THE LOAF OF AGRICULTURE. Sci. Monthly 42: 5-29. January 1936.

Presents a survey of departmental research. "Research in erosion control requires the synthesis of a number of divisions of science, since erosion is a complex phenomenon . . . Two major types of investigations, exploratory and experimental, are included in the necessary research . . . In this brief outline I have attempted only to point out some of the factors involved in soil conservation research—chiefly those factors about which

too little is now known . . . In the Agricultural Adjustment program, major emphasis is laid on Soil Conservation and better use of land."

WALLACE, H. A.

(585)

RURAL POVERTY. 16 pp. 1937. [Mimeographed.]

An address before the third general assembly of the Council of State Governments, Washington, D. C. January 23, 1937. Among the policies directed toward the improvement of the lot of the impoverished American farmer the importance of soil conservation and erosion control are stressed.

(586)

THE SECRETARY'S REPORT . . . U. S. Dept. Agr. Yearbook. 1935.

In the section on soil-depleting practices, pp. 64-65, recommendations are made for reforestation, substitution of permanent pastures and forage for intensive crops, and systems of rotation introduced to check erosion and restore fertility. Crop-benefit payments are considered.

In the section on soil erosion, pp. 100-101, erosion control practices and methods, and comments on the work of the erosion experiment farms and C. C. C. gully-control operations are described.

(587)

SOIL CONSERVATION. U. S. Dept. Agr. Yearbook 1936: 59-62. 1936.

Land-use problems and their relation to soil erosion are discussed. Various types of erosion are described. The reconnaissance survey conducted by the Soil Erosion Service in 1934 is summarized. "Practical measures in the control program fall generally into three main categories: (1) Adaptations of thick-growing vegetation to practical farm operations; (2) use of engineering structures, such as terraces and dams; and (3) the retirement of excessively eroded land from cultivation. . . ." The procedure on demonstration areas is outlined.

(588)

SOIL EROSION STUDIES. U. S. Sec. Agr. Rept. 1933: 79-80. 1933.

Gives a brief account of the scope and progress of investigations in soil erosion control at 10 regional stations.

WALSER, PAUL H.

(589)

DEMONSTRATING EROSION CONTROL ON BIG SCALE. Farm and Ranch 53: 3 illus. September 1, 1934.

This article describes erosion-control demonstrations on Duck Creek in Smith County, Tex., and outlines future work.

WALTHER, ERIC.

(590)

THE INSPIRING STORY OF GOLDEN GATE PARK. Soil Conserv. 2: 72-73, 82-83, illus. October 1936.

The author describes the making of Golden Gate Park, San Francisco, Calif., over a desert of sand dunes. He relates the difficulties incidental to such an effort in reclaiming wastelands and turning them into one of the foremost beauty spots in the country.

WARD, HAROLD.

(591)

EROSION: THE NEMESIS OF SOIL. New Repub. 86: 161-163. March 18, 1936.

A summary of the annual loss to the Nation through soil erosion. Describes the Soil Conservation Service program.

WARFIELD, S. W.

(592)

EROSION OF SOIL, OR WASHING AWAY OF OUR FARMS. Tenn. Dept. Agr. Bien. Rept. 1903-4: 115-120. 1904.

The writer contends that "cotton takes as little from the soil as any crop we grow." The slipshod, shallow way in which cotton used to be cultivated and the straight rows, no matter how steep the hill, left the soil an easy prey to washing rains which left bare rocks and barren subsoil. The Mississippi River became so filled with mud about 1850 that sea-going vessels could not enter. A survey showed the volume of sedimentary matter deposited in the river each year—the topsoil of Tennessee farms. Deep plowing, contour plowing, and rotation crops with as much grass and clover as possible are advocated for erosion control.

WASHINGTON AGRICULTURAL EXPERIMENT STATION. (593)

PACIFIC NORTHWEST SOIL EROSION AND MOISTURE CONSERVATION EXPERIMENT STATION. Wash. Agr. Expt. Sta. (Ann. Rept. 41) Bull. 260: 69-75. 1931.

"The objects of the work are primarily (1) to minimize erosion, and (2) to secure a more complete conservation of moisture." Papers included are: Terracing Studies, by P. C. McGrew; Tillage Experiments, by W. A. Rockie and P. C. McGrew; Controlled Erosion Vegetation Plots, by W. A. Rockie; Erosion Survey, Colfax, Wash., by W. A. Rockie and P. C. McGrew; Wind Erosion Studies, by W. A. Rockie and P. C. McGrew; Soil Moisture Investigations, and an Erosion Survey of the Northwest, by W. A. Rockie.

PACIFIC NORTHWEST SOIL EROSION AND MOISTURE CONSERVATION EXPERIMENT STATION. Wash. Agr. Expt. Sta. (Ann. Rept. 42) Bull. 275: 67-75. 1932.

The report of erosion experiment work includes the following: Vegetative Control of Erosion, by W. A. Rockie and A. J. Johnson; Terracing Studies, by P. C. McGrew; Tillage Experiments, by W. A. Rockie and P. C. McGrew; Soil Moisture Investigations, by W. A. Rockie; Effect on Erosion of Hogging-off Waste Peas, by W. A. Rockie and P. C. McGrew; Wind Erosion Studies, by W. A. Rockie and P. C. McGrew.

PACIFIC NORTHWEST SOIL EROSION AND MOISTURE CONSERVATION EXPERIMENT STATION. Wash. Agr. Expt. Sta. (Ann. Rept. 43) Bull. 291, 75 pp. 1934.

On pages 59-64 is given a report of studies made, among which are: Vegetative Control of Erosion, by W. A. Rockie and A. J. Johnson; Study of Species, Varieties, and Strains of Perennial Grasses and Legumes for Erosion Control, by A. L. Haffenrichter and W. A. Rockie; Terracing Studies, and Operation of Machinery on Terraced Land, by P. C. McGrew; Tillage Experiments, by W. A. Rockie and P. C. McGrew; Wind Erosion Studies, by W. A. Rockie and P. C. McGrew; Erosion Survey of Severely Eroded Area near Colfax, Wash., by W. A. Rockie and P. C. McGrew; Erosion Survey of the Northwest, by W. A. Rockie.

[WATSON, G. C.] EROSION IN THE EMPIRE. Queensland Agr. Jour. 45: 404-407. April 1, 1936. (596)

Serious erosion in South Africa, Australia, Palestine, and Canada is described. States that "now there are many remedies for the evils of erosion. The most simple and effective include preservation of the soil's natural cover of trees and herbage; in short, by wise and provident methods of agriculture. The most expensive and (in some cases) the most ineffectual are those involving the construction of huge dams and weirs with their highly paid staffs of hydro-technical engineers. This method, at any rate in the Union of South Africa, has been condemned by experts as tackling the problem at the wrong end. The service of the botanist and the forester, they say, should be called before that of the engineer and the stonemason; in other words, the work of control should commence in watershed areas."

WATSON, J. SOIL EROSION. A FEW NOTES ON STORM DRAINS AND THEIR PRELIMINARY CONSTRUCTION. Rhodesia Agr. Jour. 22: 59-64, illus. February 1925. (597)

"This article is concerned with erosion or soil washing and the preliminary construction of storm drains above lands, and deals not at all with sheet erosion, which is caused by heavy rain falling on the land itself." The author gained the actual experience in carrying out work on his farm.

WEBB, WALTER P. THE GREAT PLAINS. 525 pp., illus. Boston, Ginn & Co. 1931. (598)

An interpretation of the life of the people who settled on the Plains and how these people changed their mode of living. In chapter VIII, pages 319-375, under the heading "The Search for Water in the Great Plains" the author discusses the available moisture supply, irrigation, and dry farming. "Dry farming is not farming without moisture: it is farming where the moisture is insufficient. A Californian, Professor E. W. Hilgard, made the experiments which proved conclusively that the arid lands were even more fertile than the humid lands because the humus had not been washed from

the soil . . . the dry-farmer stores the water in the soil itself, just beneath the growing crops, and then cultivates the crops in such a way as to establish a connection between the plant roots and the stored moisture." Discussing various vagaries of the search for water in the Great Plains, the author refers to the continual hope of the people that Nature may set aside one of her long-established laws for their benefit. "The first explanation was that rainfall would follow settlement. The plowing up of the land would hold the moisture, would increase evaporation, and would make precipitation possible. The growing of crops would in some way have the same effect. The burning of the prairie would produce rain. . . ." References cited for this chapter, pages 383-384.

- WEHRWEIN, G. S. (599)
THE SECOND CONSERVATION CRUSADE. Jour. Land and Pub. Utility Econ. 12:
421-422. November 1936.

The writer attributes the lack of tangible and far-reaching effects of the enthusiasm for conservation which Theodore Roosevelt aroused to the fact that "the fundamentals of economics, the framework of our institutions and the legal aspects of conservation were largely ignored . . . because the 'wolf criers' had deadened the nerves of the public by their overemphasis and distortion of facts." The author expresses the hope that "this second crusade" for conservation will not make the mistakes of the first.

- WEIR, W. W. (600)
SOIL EROSION IN CALIFORNIA: ITS PREVENTION AND CONTROL. Calif. Sta. Bull.
538, 45 pp., illus. 1932.

"This well-illustrated bulletin describes prevailing conditions of soil erosion in California and presents practical information on control with particular reference to terracing, contour cultivation, strip cropping, under-drainage, and the use of soil-saving dams."—Expt. Sta. Rec. 68: 389. 1933.

- WEYBRIGHT, VICTOR. (601)
THE VALLEYS AND THE PLAINS. FLOODS, DROUGHTS AND MORRIS L. COOKE. Sur-
vey Graphic 26: 145-149, illus. March 1937.

In discussing flood, drought, and soil-erosion problems Weybright cites the opinions of Morris L. Cooke, former Administrator, Rural Electrification, who maintains that a complete solution of these problems will not be realized until there is a concerted effort on the part of the people to cooperate with the Soil Conservation Service program, plus an extensive program of dam building.

- WHIPPLE, G. (602)
A HISTORY OF HALF A CENTURY OF THE MANAGEMENT OF THE NATURAL RESOURCES
OF THE EMPIRE STATE, 1885-1935. N. Y. Conserv. Dept., 199 pp., illus. 1935.

"Generally, this history attempts to present a connected story by tracing events from cause to effect and by bringing together under their related heads many fragmentary but essential elements of the conservation movement which have been garnered from more than 75 publications. This is the first time that an attempt has been made to produce a comprehensive writing on conservation in New York."

- WHITE, EDWARD LUCAS. (603)
WHY ROME FELL. 364 pp., illus. New York, Harper & Bros. 1927.

The purpose of this volume is to correlate and discuss the various political and socioeconomic causes leading to Rome's destruction. Considerable attention is given to the factor of religion and its influence. On pages 271-273 a brief discussion is given of soil exhaustion which led to a decline in the standard of living, and a falling off of population.

- WHITE, OWEN P. (604)
ALL WASHED UP. Collier's Weekly 94: 12-13, 43-44, illus. September 29,
1934.

The writer traveled around the United States to get the true story of what soil erosion is doing to the country. The difficulty of making farmers understand the need for erosion-control measures is stressed. Instances are given of farms where topsoil has washed away and left them derelict. Coon Valley, Wis., is described as an example of the disaster caused by gullies and soil washing.

WHITNEY, MILTON.

(605)

SOIL AND CIVILIZATION. 278 pp. illus. New York, D. Van Nostrand Co. 1925.

The author presents a modern concept of soil and the historical development of agriculture. In chapter 3 methods of soil control are considered under the following headings: Irrigation and Drainage; Adaptation of Soil To Best Suited Crops; Crop Rotation; Plowing; and Fertilizers. Agriculture in the older countries of the world is discussed.

WHITSON, A. R., and DUNNEWALD, T. J.

(606)

KEEP OUR HILLSIDES FROM WASHING. Wis. Agr. Expt. Sta. Bull. 272, 18 pp., illus. 1916

"This bulletin deals with the extent and bad results of erosion on Wisconsin soils and describes preventive measures applicable to conditions of the State, including tillage, alternation of crops on sidehills, use of horizontal channels and terraces, protection of ravines and water courses with stones and grass roots, gradual removal of trees from wooded hillsides, and the use of sidehill land for pasture."—Expt. Sta. Rec. 36: 422. 1917.

WHITTLE, C. A.

(607)

EXTENDED SOIL EROSION BATTLE LINES. Atlanta and West Point R. R. Co., The Western Railway of Alabama, Ga. R. R., Agr. Dept. (Atlanta, Ga.) Bull., pp. 17, 29, illus. Fall 1935.

Cooperation of Georgia farmers with the United States Soil Conservation Service is described as "adopting a five-year cropping program; changing the old and familiar field lines; reorganizing the layout; constructing terraces of the right kind in the right place; planting trees where trees belong; establishing new pastures . . ."

WILBUR, R. L., and DUPUY, W. A.

(608)

CONSERVATION IN THE DEPARTMENT OF THE INTERIOR. 253 pp., illus. Washington, Govt. Print. Off. 1931.

Under Public Lands, pages 31-48, the subject of utilization of the public domain, grazing, erosion, and protective policies are discussed.

WILCOX, W. W.

(609)

INTERRELATIONSHIPS OF LIVESTOCK PRODUCTION AND CROPPING SYSTEMS ON IOWA FARMS. Jour. Farm Econ. 18: 695-705. November 1936.

Data "furnish little grounds for the often expressed fear that dairy production in Iowa and in the Corn Belt generally will be stimulated to a ruinous extent by the soil conservation program."

WILHELM, D.

(610)

TENANT EROSION. Country Gent. 84: 15, 43. April 5, 1919.

An authorized interview with Senator Cummins of Iowa, who "likenes the loss of agricultural productivity, due to unsatisfactory land tenancy, to land erosion, which, by the way, is carrying down to the sea a tremendous soil potentiality." He suggests as a remedy, that methods used in England, Scotland, Ireland, and Wales, be used more generally in the United States.

WILSON, C. P., NEALE, P. E., PARKER, K. W., and WATENPAUGH, H. N.

(611)

SOIL AND RAINFALL CONSERVATION IN NEW MEXICO. N. Mex. Agr. Expt. Sta. Bull. 238, 45 pp., illus. 1936.

This bulletin is in two parts. Part 1, entitled "On Range Lands", discusses the effects of overgrazing on plant cover. Part 2, entitled "On Farm Lands", deals with the slope, texture, structure, and organic matter of the soil, methods for soil and rainfall conservation, water and wind erosion, and floodwater utilization and control.

WILSON, M. L.

(612)

THE BEST USE OF THE LAND. Rural Amer. 14: 8-9. May 1936.

The author reviews the recommendations of the National Resources Board and analyzes the waste of land. "First there is soil erosion. The top 6 to 12 inches of soil is the most important asset of a farm. But in addition to thirty-five million acres destroyed by erosion—gullies, soil leaching—there are one hundred million acres now heading the same way and countless other acres are feeling steadily year by year the effects of the loss of soil, of plant nutrition, and the cost of producing farm crops in the aggregate must go up."

WING, DEWITT C.

(613)

FOR THE LAND'S SAKE. *Nation's Agr.* 11(7) : 18, April; (8) : 9, illus., May; (9) : 12, June 1936.

The author discusses soil erosion, its causes and effects on the living standards of individuals. The need for conservation for the protection of American posterity and the need for the individual cooperation of all farmers to further the soil conservation program, are pointed out.

(614)

TAKE CARE OF THE LAND. THE NATION IS BEGINNING SERIOUSLY TO DEAL WITH EFFECTS OF PAST ABUSES. *Ind. Farmer's Guide* 92 : 4, illus. July 18, 1936.

The author discusses soil-fertility depletion and states that "grass, trees, legumes, and other thick-growing plants are 65 times more effective than clean-tilled crops in holding soil against washing." Article by same title appears in the South. *Planter* 97 (9) : 17. September 1936.

WINTERS, N. E.

(615)

NATIONAL ASPECT OF SOIL EROSION. *Farm and Ranch* 53 : 1, 4, 14, illus. March 15, 1934.

"The Soil Erosion Service has selected demonstration areas in Oklahoma, Texas, Kansas, Wisconsin, Missouri, California, South Carolina, Illinois, and the State of Washington, and others are being organized. This is the first attempt in history to put through, on a large scale, comprehensive erosion and flood control projects, . . ." This article discusses at some length erosion problems in Oklahoma.

(616)

SOIL CONSERVATION SERVICE DEFINED. *Agr. Leaders' Digest* 17 : 12. October 1936.

The difference between the Soil Conservation Service, established in April 1935, and the Soil Conservation and Domestic Allotment program of 1936 is pointed out.

(617)

SOIL MOISTURE AND CONSERVATION NEEDED IN SOLVING OKLAHOMA FARM PROBLEMS. *Okla. Agr. Expt. Sta. Bien. Rept.* 1930-32 : 7-14, illus. 1932.

"The erosion survey of Oklahoma soils indicate that 85 per cent of the cultivated fields are losing soil very rapidly from uncontrolled rainfall." Results of methods used at the Guthrie Experiment Station and its sub-stations for conserving soil and moisture are given. Mechanical methods and soil and crop management practices to reduce soil and water losses are discussed.

WINTERS, R. Y.

(618)

SOIL EROSION AND MOISTURE CONSERVATION. *N. C. Agr. Expt. Sta. Ann. Rept.* 55 : 17. 1932.

Points out that the losses in North Carolina due to soil washing amount to \$66,000,000 annually and outlines some of the objectives of the soil-conservation program.

WISCONSIN AGRICULTURAL EXPERIMENT STATION.

(619)

NEW SCIENCE FOR AN OLD ART. *Wis. Agr. Expt. Sta. Bull. (Ann. Rept. 1928-29)* 410 : 1-12, illus. 1930.

"Our rivers run to the sea, and they are annually taking with them millions of tons of the State's most fertile soil." The erosion problem in Wisconsin is reviewed under such headings as: Keeping Wisconsin at Home; Soil Type Important Factor in Erosion; Sources of Flood Water; and Forests Absorb and Hold Flood Waters.

(620)

SOIL EXPERIMENTS. *Wis. Agr. Expt. Sta. Bull.* 425, 145 pp., illus. 1933.

Pages 55-65 outline the investigations of the upper Mississippi Valley erosion station established in 1932 in cooperation with the Wisconsin Agricultural Experiment Station. "Erosion is one of the most destructive factors with which farmers have to contend, and it is the purpose of this new station to develop erosion-control methods particularly adapted to the soils, topography and climate of the Upper Mississippi Valley."

WISCONSIN UNIVERSITY.

(621)

THE UNIVERSITY AND CONSERVATION OF WISCONSIN WATERS. Wis. Univ. Sci. Inquiry Pub. 2, 79 pp., illus. 1936.

The purposes of this publication are to outline the problem of water conservation, to indicate the nature of necessary research, and to show what facilities are available at the university to students of water resources.

(622)

THE UNIVERSITY AND THE EROSION PROBLEM. Wis. Univ. Sci. Inquiry Pub. 1, 46 pp. 1935.

This publication outlines the problem of soil erosion and erosion control and indicates the nature of research necessary to cope with the problem. It also shows what facilities are available at the university to students of erosion.

WOHLETTZ, L. R.

(623)

LA HABRA PROJECT. Soil Conserv. Digest 2 (12): 8-9. September 1936. [Mimeographed.]

Discusses principal crops involved, winter cover cropping, need for terrace outlets, and sheet and gully erosion on the Soil Conservation Service project located about 25 miles southeast of Los Angeles.

WOLFF, D. K.

(624)

ARE WE JUSTIFIED? Penn State Farmer (n. s.) 2: 246, 288, illus. April 1937.

In view of present erosion damage the author questions: "Were we right in placing so much faith in our plows?" Tabulations indicate the average number of days each year that the soil is left uncovered under the various cropping systems. "These figures should not be interpreted to mean that erosion loss is necessarily in direct proportion to days of exposure, but they do mean that with any cultivated crop and any rotation scheme there is more or less opportunity for excessive erosion to occur."

WOLMAN, ABEL.

(625)

PROGRESS OF FEDERAL CONSERVATION OF WATER RESOURCES 1936-1937. Jour. Amer. Waterworks Assoc. 29: 915-941. July 1937.

This paper was presented at the Buffalo convention, American Waterworks Association, July 1937. The author discusses basic hydrologic data and research in progress; bills introduced and laws passed covering pollution control, irrigation, flood control, and beach-erosion control; contributions toward a coordinated water plan by Federal, State, and interstate measures.

WOMBLE, H. G.

(626)

RUNAWAY FARMS. [A booklet to be had for 10 cents from Information Department, Capper's Farmer, Topeka, Kans.]

WOOD, J. D.

(627)

CONSERVATION IN IDAHO. (An Idaho State Planning Bd. Address.) 6 pp. September 25, 1936.

This address was given at the Idaho State Federation of Women's Clubs, at Mountain Home, Idaho. States that the Idaho State Planning Board aims to cooperate with and coordinate the work of all other agencies in the conservation of natural resources. Discusses mainly water resources and the ill effects of decreased vegetative cover, forest denudation, and overgrazing. Land-use planning activities as affected by the Taylor Grazing Act, and wildlife conservation are also mentioned.

WOODS, A. F.

(628)

FOREST DESTRUCTION AND SOIL EROSION DESTROYING LAND FERTILITY RAPIDLY. U. S. Dept. Agr. Yearbook 1931: 252-253. 1931.

Discusses soil erosion in the United States. Comparison is made with denudation in Asiatic countries.

WOOTON, E. O.

(629)

THE RELATION OF LAND TENURE TO THE USE OF THE ARID GRAZING LANDS OF THE SOUTHWESTERN STATES. U. S. Dept. Agr. Bull. 1001, 72 pp. 1922.

Bibliography, pages 68-72.

"The business of raising stock on the arid grazing lands of the United States is said to be automatically limited by physical and natural factors;

the resultant forage crop; and social and economic conditions, such as the laws and customs determining methods of land utilization, marketing conditions, and methods of financing the business. Plant and animal competition, soil moisture and erosion, poisonous plants, wild animals, watering places, and miscellaneous factors are described as some of the natural conditions governing this industry."—Expt. Sta. Rec. 46: 784. 1922.

WORK, H.

(630)

CONSERVATION MEANS HIGHEST PRODUCTION ON EACH ACRE. Reclamation and Farm Engin. 9: 9-11, illus. January 1926.

The conservation of land is a problem in the East as well as in the West. "The meaning of conservation must be reduced to simple terms; be taught in the schools, become an individual responsibility stressed by authorities in State . . . Reclamation for a growing nation of 110,000,000 people should, from now on, include recapture and restoration of lost soil fertility . . . We should farm less and farm better."

WRIGHT, J. O.

(631)

RECLAMATION OF TIDE LANDS. U. S. Off. Expt. Stas. Ann. Rept. 1906: 373-397, illus. 1907.

"In order to encourage the development of these marine marshes, the Federal Government should be induced to cause a survey to be made to determine their area, character, and fitness for reclamation and the probable cost of doing the work." The author discusses three points requiring special attention and treatment: (1) The method of protecting the land from overflow by tide waters; (2) the plan of internal drainage; and (3) treatment of the soil to eliminate excessive silt. Location of dikes and specifications for building are given.

WRIGHT, L.

(632)

CONTROLLING SOIL EROSION WITH DAMS. Engin. and Contract. 66: 306. July 1927.

The writer quotes H. H. Bennett as authority for the statement that 20 times as much plant food material is lost annually by erosion as is removed from the soil by crops. Conservation by means of terracing and damming are discussed.

ZEASMAN, O. R.

(633)

CONTROL SOIL EROSION BY CROPS, TERRACES AND DAMS. Wisc. Agr. Col. Ext. Cir. 249, 31 pp., illus. 1931.

The author explains the two worst forms of erosion; causes and control of soil erosion; erosion areas of Wisconsin; and making the soil absorbent by holding run-off water through underdrainage and deep plowing. Types of terracing and costs, together with instructions on building gully dams, are considered. "The problem of erosion increases with age of farming. On virgin soils erosion was scarcely noticed. Now at least a million acres of farm land in Wisconsin have been seriously damaged, and limited areas have been entirely destroyed by erosion."

(634)

EARLY WORK ON SOIL EROSION CONTROL IN WISCONSIN. Save Our Soil 1: 3. March 1936.

A summary of work done in Wisconsin during the 10 years ended in 1932. The author relates that "the first soil erosion-control work done as a Wisconsin extension project was done primarily to protect highways."

ZOBELL, I. D.

(635)

SOIL-MANAGEMENT AND CROP-PRODUCTION STUDIES, CARBON COUNTY AREA. Utah Agr. Expt. Sta. Bull. 270, 22 pp., illus. 1936.

Soils are classified as belonging to the Billings series and are generally known as a very fine sandy loam; low in organic matter; tend to absorb water slowly, and especially susceptible to erosion. Gullies are said to be increasing at an alarming rate in this area, for which overgrazing is responsible to a large extent. Windbreak and wood-lot studies have led to the conclusion that Siberian elm and Russian-olive trees are most suitable for this particular area.

ZSCHOKKE, T. C.

(636)

THE PROBLEM OF SOIL SAVING IN THE HAWAIIAN ISLANDS. Hawaii Agr. Ext. Bull. 11, 25 pp., illus. June 1931.

"Prevention is better than cure, hence a part of this bulletin is devoted to the harm done by erosion to the land itself and to the consequent loss to land owners. Some space is taken up by a consideration of ways of preventing erosion in agricultural land . . . The methods of saving the top-soil include better tillage, the use of cover and green manuring crops, broad-base terraces and the laying out of plant rows and ditches in such a way as to handle surface runoff more effectively." Present soil conditions in the Hawaiian Islands and how to prevent erosion are the two subjects discussed.

EROSION IN GENERAL

ANONYMOUS.

(637)

BEACH-EROSION STUDIES BY FEDERAL BOARD. Engin. News-Rec. 111: 281-283, illus. September 7, 1933.

A review of the preliminary findings of an interim report issued April 1933 by the Beach Erosion Board of the United States War Department. It presents data on current velocities near the shore, sand movement, rate of erosion along the normal beach and at inlets, and the action of groins. Studies were made at Fort Fisher, N. C., and along the New Jersey and New York coast lines.

(638)

DOUBLE EROSION LOSSES. West. Farm Life 38: 4. August 15, 1936.

An editorial discussing unchecked soil erosion, the cause of topsoil loss, and reservoir silting.

(639)

GRASS BURNING AND EROSION. Farming in So. Africa 5: 570. March 1931.

The seriousness of grass burning and consequent carrying away of soil by wind and storm waters are discussed.

(640)

HOUSE DIVIDED. (Editorial.) Amer. Forests 39: 27. January 1933.

Two different pictures of erosion are described: the one seen with alarm by the United States Department of Agriculture, and one that members of the Geological Survey regard with no alarm. "It is to be regretted that views so divergent and so confusing to public enlightenment upon an important national question flow out of Washington. The work of erosion and floods . . . is a question of national concern . . ."

(641)

MAKE YOUR SOIL STAY AT HOME. Wallaces' Farmer 55: 1662, illus. October 18, 1930.

"The greatest loss caused by drainage water comes as a result of sheet erosion, or the carrying away of soil and valuable plant food by the tiny rivulets that eventually dump into the raging streams below." The writer points out that soil erosion begins long before ditches appear and advises that methods of terracing suitable to local conditions be put into effect.

(642)

MIND EROSION. (Editorial.) Sat. Review Lit. 13: 8. April 4, 1936.

A picture is sketched of the effects of man-made erosion in the United States.

(643)

SOIL EROSION. Amer. Fert. 68: 33-34. June 9, 1928.

"Erosion takes \$2,000,000,000 annually in soil fertility . . . there are national associations for the preservation of wild flowers and wild life, but none for the preservation of the soil." The writer thus quotes United States Department of Agriculture Circular 33 and notes the lack of scientific or popular information on the subject of soil erosion and conservation.

ANONYMOUS.

(644)

SOIL EROSION. *Science* (Sup.) 72: 12. October 3, 1930.

The writer briefly comments on an address by H. H. Bennett at the first Inter-American Conference on Agriculture, Forest, and Animal Industry, in Washington.

(645)

SOIL EROSION IS MENACE TO NATION. *East Tex.* 11: 5, 16. August 1937.

"Wasteful crop raising methods have cost this nation \$20,000,000 during the last fifty years, have destroyed or damaged productivity of three-fourths of the nation's farm lands and rapidly are causing the washing of the best soil of Texas into the Gulf of Mexico."

(646)

SOIL EROSION RUINS MANY FERTILE ACRES. *Ext. Farm News* 20: 1. (Raleigh, N. C.) April 1935.

"Fifty-nine percent of the land in North Carolina has been damaged by soil erosion . . ." The sections in which the most serious damage has taken place are discussed.

(647)

SOIL EROSION SHOWN AS MANIFOLD MENACE. *Sci. News Letter* 27: 76. February 2, 1935.

The writer comments on addresses by Lowdermilk and Uhland of the Soil Conservation Service and Henry S. Conard of Grinnell College, at a memorial meeting at Iowa State College, Ames, Iowa.

(648)

STOPPING A NATIONAL PERIL—EROSION. *Illus. World* 34: 823-824. January 1921.

"The newest of countries may come to the same fate as the oldest. The forests of the United States may be eradicated like those of China . . . Deforestation means, more than anything else, erosion of lands and consequent decrease in the fertility of the soil . . . Fertility is not only destroyed but the very soil itself is washed away, leaving barren washes where formerly good grazing and agricultural acres were to be found."

(649)

THE TEALE FARM—THEN—AND NOW. *The Land, Today and Tomorrow* 1: 20-21, illus. November 1934.

A brief description of the desolation and abandonment of a farmhouse resulting from the encroachment of soil erosion.

(650)

WILL HISTORY REPEAT ITSELF? THE STORY OF THE FALL OF AN ANCIENT AMERICAN CIVILIZATION POINTS A MORAL FOR THE AMERICAN OF TODAY. *Save Our Soil* 1: 1, 2. February 1936.

Attributes the fall of the Mayan empire to the failure to practice soil-erosion control and prophesies the same fate for the United States, if steps are not taken to control our land policy.

AINSLIE, JAMES R.

(651)

SOIL EROSION IN NIGERIA. 4th Brit. Empire Forestry. Conf. (So. Africa), 14 pp., illus. 1935.

The physical features and climate of Nigeria are described. The writer states that the most active erosion factors in this area are rain and wind. Sheet erosion is going on with great rapidity. "There is little doubt that the destruction of the natural vegetation of the country is the fundamental cause of ninety-five percent of the erosion now going on." Antierosion measures are described and discussed. A vegetation map of Nigeria is attached.

ALCIATORE, H. F.

DESTRUCTIVE RAINSTORM OF APRIL 8-9, 1913, IN ARKANSAS. *U. S. Monthly Weather Rev.* 41: 584-585. April 1913.

The weather conditions before the rainstorm and its progress are considered. All previous records for heavy rainfall were broken at Little Rock, Ark. A table shows the quantity of rain recorded during the storm at regular and cooperative stations of the Weather Bureau.

- ALDABA, V. C. (653)
ON THE GROWTH OF COCONUT ROOTS. Philippine Jour. Agr. 3: 59-64, illus. 1932.
The exposure of the upper part of the root system of coconut trees about 15 years of age or older is mainly due to the erosion of the soil caused by heavy tropical rains. Experiments and results are discussed and illustrated.
- ANTHONY, HAROLD G. (654)
GOFORTH'S STORES STAND IDLE—HER STREETS GROW WEEDS. Soil Conserv. 3: 47, 50, illus. August 1937.
A description of the abandonment and desolation of the town of Goforth, Hays County, Tex. Accelerated soil erosion is cited as the chief cause.
- ONE LESSON OUT OF THOUSANDS—A TRUE STORY. The Land, Today and Tomorrow 2: 28-29. April 1935. [See also Prog. Farmer (Miss. Ed.) 50: 9, 57. May 1935.] (655)
The plight of a colored family in Jackson Parish, La., impoverished by the encroachment of soil erosion on their 40-acre farm is told.
- ASHE, W. W. (656)
THE WASTE FROM SOIL EROSION IN THE SOUTH. Rev. of Reviews 39: 439-443, illus. April 1909.
"The profits of the farmer noiselessly flow from his sloping fields in muddy streams . . . Soil exhaustion and erosion are the fundamental causes. The exhausted 'old fields,' eroded, gullied, raw with deep wounds, and red as though stained with carnage, need only the touch of knowledge to become revived . . . Erosion is the basal problem which underlies soil exhaustion in this region, and so prevalent and so disastrous is it that it has become not only a serious local agricultural problem, but an important national problem as well, affecting the value of many investments which have been made in the region." The effect of heavy rainfall, destruction of farms, increasing floods, terracing to check erosion, and tree-planting are all considered.
- ATWOOD, A. W. (657)
IS THIS CONSERVATION? Sat. Evening Post 209: 23, 96-98, illus. September 26, 1936.
Traces the history of conservation in principle and in practice. Attributes soil erosion on public lands to overgrazing.
- AUTEN, J. T. (658)
STORY OF HAY HOLLER. Amer. Forests 39: 386-389, illus. September 1933.
The depletion and abandonment of farms in the Central States are described. "Hay Holler" is a valley in Vinton County, Ohio. The author describes erosion processes which caused its inhabitants to leave and settle elsewhere.
- BAKER, O. E. (659)
THE FUTURE NEED FOR FARM LAND. U. S. Bur. Agr. Econ. 28 pp., illus. 1934. [Mimeographed.]
The statement is made that the depletion of soil fertility by erosion is advancing at an accelerating rate. Data are given on soil-erosion losses throughout the United States.
- BATES, C. G. (660)
EROSION AND THE MIDDLE WEST'S "BALD FARMS". Commerce 28: 30-31, 56, 58, illus. October 1931.
"Half century of engineering to control the Mississippi and other huge streams from disastrous floods proves necessity for going back to source of water for reduction of flow . . . correction at sources means redamming of swamps, impounding at gully outlets and more tree planting." Topsoil must be protected and farmers instructed in methods of plowing that will afford protection for their fields.

BENNETT, H. H.

(661)

IT'S YOUR SOIL—SAVE IT! Save Our Soil 1: 1, 2. March 1937.

Shows that the cost of erosion to the country is approximately \$400,000,000 annually in reduced yields, abandoned acres, and lost fertility.

SOIL EROSION. Okla. Agr. Expt. Sta. Cir. 79: 62-69. 1931.

(662)

A paper read at the second Southwest Soil and Water Conservation Conference. Views the problem from a national standpoint and suggests broader methods of control.

SOIL EROSION A NATIONAL MENACE. Jour. Forestry 26: 520-527. April 1928.

(663)

This article is written from the viewpoint of plant food wastage through erosion. Figures are used to illustrate the annual discharges to the sea by rivers. The writer says: "The greatest error made in estimating the work of erosion on the basis of river silt comes from the fact that vastly more material is washed out of fields and pastures and deposited over lower slopes and flats and upon the flood plain upstream and in their channels than is carried into tidewater . . . There are good reasons to believe that the actual quantity of material thus stranded along the drainage basins every year is a hundred times the amount that actually reaches the sea."

SOIL EROSION CAUSES \$200,000,000 LOSS TO FARMERS EACH YEAR. Engin. and Contract. 65: 243. November 1926.

(664)

Figures in acreage and dollars lost through annual rainwash are given. "Rushing rainwater sweeping over the fields of the United States carries away 20 times as much plant-food every year as is permanently removed by the farmers' crops . . . Probably not less than 10,000,000 acres of land formerly cultivated have been permanently destroyed by rain-wash."

SOME ASPECTS OF SOIL EROSION AS A NATIONAL PROBLEM. Amer. Soil Survey Assoc. (Ann. Rept. 9) Bull. 10: 55-74. 1929.

(665)

"We know that at least 513 million tons of suspended soil material are carried out to tidewater every year by the rivers of the country . . ." Figures on plant food loss through soil deficiencies are quoted and examples of destruction and impairment of land are discussed. "In almost countless grazing areas and in many irrigating regions splendid valley lands have been ripped to pieces with gullies in western Texas, New Mexico, Arizona, Colorado, Utah and in parts of California . . ." Sheet erosion, relation of soil type to erosion, and relation of erosion to floods and land protection are among the subjects treated.

BOWIE, WILLIAM.

(666)

THE EARTH AS AN ENGINEERING STRUCTURE. Sci. Monthly 32: 457-460. May 1931.

A discussion of geologic erosion and soil washing. Findings of the United States Geological Survey in soil losses are given.

BUSFIELD, R. M.

(667)

FRESH WATER SHORTAGE FACES TEXAS. Tex. Weekly 12: 4-5. December 12, 1936.

Salt pollution is beginning to show in the underground fresh water supply in Texas. "The solution of Texas's year-around fresh water problem lies partly in the utilization of the flood waters which yearly exact a heavy toll from Texas farms and cities . . . This immense supply of fresh water tumbles into the Gulf of Mexico carrying with it millions of tons of rich and fertile top soil from Texas farms." The writer advocates the immediate acceptance of the recommendations for water conservation drafted by the water resources committee of the Texas State Planning Board.

- CHAMPION, A. M. (668)
 SOIL EROSION IN AFRICA. *Geogr. Jour.* 82: 130-139. August 1933.
 "Conditions . . . in Africa are different from those in many parts, where increased density of population has stimulated the development of improved technique, for the Africans seem to have remained static: The increased population demands more from the soil, and yet knowledge regarding its preservation has not progressed." The author discusses the causes of accelerated soil erosion; the nature and physical structure of the soil; the formation and geological structure of the underlying rocks; the gradient on which soil rests; atmospheric conditions; the existence or absence of a mantle of vegetation and its nature; nature and extent to which the land is cultivated; and overgrazing by stock. He urges the need for regulated and systematic research in all problems of soil erosion.
- CHAPLINE, W. R. (669)
 SOIL EROSION A NATIONAL MENACE. *Cattleman* 15: 37-39, illus. June 1928.
 "Erosion, the removal of the soil cover by water and wind, has been materially hastened by depletion of the vegetation on western range lands." Overgrazing, the formation of gullies with consequent widening and deepening of them, and the need for measures of prevention are stressed by the author. "Faced with so big a problem, research needs the most earnest encouragement and support."
- CLINE, JOHN H. (670)
 EROSION A LINK IN A TRAGIC STORY. NEW SOIL PROGRAM UNDERTAKEN TO SAVE LAND FROM WANTON DESTRUCTION. Washington (D. C.) *Sunday Star*, p. 1 (Ed. sec.). March 29, 1936.
 The writer contends that careless farming is bringing about the self-destruction of America. "Floods and dust-storms . . . are only spectacular demonstrations of the results of insidious soil erosion in virtually every state in the Union. Careless farming and timber-cutting . . . has brought this country dangerously close to economic ruin." The land can be saved if man and science intervene to conserve the land. New legislation to this end is discussed.
- COLE, W. S. (671)
 MODIFICATION OF INCISED MEANDERS BY FLOODS. *Jour. Geol.* 45: 648-654, illus. August-September 1937.
 "The structurally controlled meanders of Coy Glen were modified in 1935 by a flood of short duration but unusual volume and force . . . As slow incision, structurally controlled, formed the spurs, their modification in a single flood is definite evidence that such erosion is extraordinary."
- [COLLIER, JOHN] (672)
 THE ORISIS UPON THE NAVAJO RESERVATION AS A WHOLE. *Indians at Work* 3: 19-20. June 15, 1936.
 The Navajo problem is acute. These Indians should be "given a chance to expand normally on additional land . . . The eroded reservation is no longer able to feed the sheep that support this virile race of original Americans."
- CONNAUGHTON, C. A. (673)
 FOREST FIRES AND ACCELERATED EROSION. *Jour. Forestry* 33: 751-752. August 1935.
 Gives information on the relation of fire to erosion in central Idaho and indicates the necessity of fire protection as a watershed-management measure.
- COOKE, C. W. (674)
 A POSSIBLE SOLUTION OF A MAYAN MYSTERY. *Sci. Monthly* 37: 362-365. October 1933.
 Attributes the decline of the ancient city of Uaxactun in Guatemala to erosional processes. Tells of soil washing from cultivated lands into a lake, converting it into a baja, or logwood swamp, unsuitable for habitation.

COOKE, C. WYTHE.

(675)

WHY THE MAYAN CITIES OF THE PETÉN DISTRICT, GUATEMALA, WERE ABANDONED. Jour. Wash. Acad. Sci. 21: 283-288, illus. July 19, 1931.

"Some of the factors . . . that may have caused the decline of the Mayan Empire and the depopulation of the Petén are (1) erosion of the soil and the consequent scarcity of arable land, (2) silting of the lakes and the destruction of water transportation, (3) diminution of the water supply during the dry season, (4) increase in the number of mosquitoes, and (5) introduction or increase of malaria." The writer describes the topography of this district, both uplands and lowlands.

COOPERRIDER, C. K., AND HENDRICKS, B. A.

(676)

EROSION ON THE UPPER RIO GRANDE. Science 84: 203. August 28, 1936.

Results are given of a recent survey of the upper Rio Grande watershed in New Mexico. It is stated that "on 40 per cent. of the watershed in New Mexico above Elephant Butte Dam, deterioration of the natural vegetation has reached an extreme stage, and the lands are excessively eroded. On 35 per cent. of the area, the plant cover is in a medium stage of deterioration, and erosion is advanced. Evidences of accelerated erosion were found on parts of all the major vegetation-type areas, principally where utilization was uncontrolled."

—, AND HENDRICKS, B. A.

(677)

SOIL EROSION AND STREAM FLOW ON RANGE AND FOREST LANDS OF THE UPPER RIO GRANDE WATERSHED IN RELATION TO LAND RESOURCES AND HUMAN WELFARE. U. S. Dept. Agr. Tech. Bull. 567, 87 pp., illus. 1937.

Striking evidences of accelerated erosion in this region are channeled valleys, arroyos, gullied slopes and sand washes, altered courses of mountain streams, accumulations of stones and sand, and disappearance of luxuriant valley grasses and soils. Destructive effects of accelerated runoff are evidenced by destruction of primitive irrigation works, silting up of river channels and reservoirs, flood destruction around Elephant Butte Dam, destruction to recreational and wildlife resources. Causes of deterioration of range and forest lands are discussed together with vegetation-erosion relationships.

Literature cited, pages 87-88.

COSBY, S. W.

(678)

CONSERVATION OF THE ORGANIC SOILS IN THE SACRAMENTO-SAN JOAQUIN DELTA. Amer. Soil Survey Assoc. Bull. 17, pp. 116-117. 1936.

Cultural burning is a general practice among tenant farmers, and even many of the more intelligent owner-operators indulge in "this insidious procedure." The author states that "from the standpoint of the Soil Conservation Service the delta region offers a novel problem, one not wholly within the field of erosion control, although severe wind erosion and soil loss occurs as a result of these fires."

CRICKMAY, C. H.

(679)

THE LATER STAGES OF THE CYCLE OF EROSION. SOME WEAKNESSES IN THE THEORY OF THE CYCLE OF EROSION. Geol. Mag. 70: 337-347. 1933.

"It has seemed to me that our theory of the stages of the cycle of erosion has suffered from two matters of defective observation: first, over-emphasis of the power of washing; second, under-estimation of the power of lateral corrosion. The whole theory was worked out at a time when denudation was supposed to be accomplished by three main processes—headward extension of tributaries, downcutting by all streams, and reduction of interfluvies by wasting . . . A fourth dominant process has been appreciated, namely, lateral corrosion. . . Nothing has been done to amend the erosion theory in the light of newer knowledge of these four kinds of action." The writer considers each of these in turn.

CRONAU, RUDOLF.

(680)

OUR WASTEFUL NATION. 134 pp., illus. New York, Mitchell Kennerley. 1908.

This is the story of American prodigality and the abuse of our national resources. "The following chapters are intended to give an idea of the enormous waste of which our people are guilty. They were written and

compiled in the hope that they might teach the lesson, that it is well to economize in the days of plenty, so that we may have sufficient in the days of need." The destruction of the forests, waste of water and soil, waste of mineral resources, vanishing game and birds, and waste of public lands and privileges are subjects discussed. The writer declared that the strongest proof of an awakening in the Nation to the danger of waste has been the conference of Governors held at the White House in May 1908.

- CROSBY, I. B. (681)
GEOLOGY IN THE MAKING. Boston Soc. Civ. Engin. Jour. 15: 33-35, illus. January 1928.

A canyon over 50 feet deep and half a mile long was made by flood waters at Cavendish, Vt., in a single night. "It is not safe to refer all cases of erosion to the distant past and consider that they have taken a very long time . . . Undoubtedly there are other places in New England where unusual flood conditions may lead to a disaster but which can be prevented if they are foreseen in time."

- DANA, JAMES D. (682)
NOTE ON EROSION. Amer. Jour. Sci. and Arts (3) 12: 192-193. September 1876.

The author describes the action of erosion and cites examples in California and the Rocky Mountains.

- DAVIS, R. O. E. (683)
SOIL EROSION IN THE SOUTH. U. S. Dept. Agr. Bull. 180, 23 pp., illus. 1915.

"This bulletin discusses the conditions affecting soil erosion as observed in a field study through the States of Virginia, Tennessee, Missouri, Mississippi, Alabama, Georgia, South Carolina, and North Carolina."—Expt. Sta. Rec. 32: 811. 1915.

- DECK, S. F. (684)
SOIL EROSION IN KENYA. Trop. Agr. [Trinidad] 13: 57-58. March 1936.

Of recent years various commissions have investigated the problem of soil erosion and denudation both in South and in East Africa. It is well known that in northern Africa what is now desert was once fertile country, carrying a large and highly civilized population. In Kenya the people are mainly pastoral, but about 140,000 acres are estimated to be under cultivation, the main crops being millet, beans, and sweetpotatoes. The denudation and soil erosion which are rapidly turning this once-fertile district into a semidesert are of recent occurrence. Erosion in Kenya occurs in an aggravated form under the following conditions: Where the rainfall is definitely seasonal; where the annual rainfall is 30 inches or less; where the geological formation is schistose or a recent volcanic ash. The older lavas generally form a stiff compact soil on which erosion is less marked.

- DICKEN, S. N. (685)
KENTUCKY SOLUTION CUESTA. Jour. Geol. 43: 539-544, illus. July 1935.

"Marginal to the Western Coal Basin in western Kentucky is a sandstone-capped cuesta, unusual in that the capping layer is less resistant, from the standpoint of normal surface erosion, than the underlying limestones. Only because solution is, locally, the more important process and only when the opened fissures in the limestone have captured the surface streams can the limestone be removed more rapidly than the sandstone. Thus the cuesta is formed and maintained (with gradual migration down dip) by solution rather than normal surface erosion."

- DOLE, R. B., AND STABLER, H. (686)
DENUDATION. U. S. Geol. Survey Water-Supply Paper 234: 78-93, illus. 1909.

"The accompanying tables present estimates of the rate of denudation in the United States. The figures show the rate at which the earth's crust is being moved as solid particles carried in suspension by streams and as matter carried in aqueous solution. The first table is a summary of the estimated denudation for the whole United States and for the primary drainage basins; the other tables contain detailed estimates for smaller areas. The map indicates graphically the rates of denudation in different parts of the country." The methods of computation and their probable

accuracy are considered. "The estimates reveal that the surface of the United States is being removed at the rate of thirteen ten-thousandths of an inch per year, or 1 inch in 760 years."

DREIER, JOHN.

(687)

THE NEW NEED FOR CONSERVATION. *Econ. Forum* 3: 395-405, illus. April-June 1936.

General discussion of land depletion in the United States.

DULEY, F. L.

(688)

SOIL EROSION FROM EARLY PLOWED WHEAT LANDS. *Jour. Amer. Soc. Agron.* 17: 731-734. November 1925.

"Studies conducted at the Missouri Experiment Station are reported which showed that under the conditions existing at the Station the increased loss of soil by erosion due to early plowing for wheat may be considerable, and during this period has been slightly more than that during the rest of the year. On the whole, however, erosion from wheat land is not extremely serious, being only about half as much as from corn land. Where wheat follows another crop like corn or soy beans, and is itself followed by clover, the erosion is greatly reduced."—*Expt. Sta. Rec.* 56: 75. 1927.

(689)

SOIL EROSION PROBLEMS IN KANSAS. *Kans. State Bd. Agr. Quart. Rept.* 49 (193A): 29-37. 1930.

An address delivered at the Kansas Agricultural Convention in 1930. The author describes the various types of erosion and discusses their cause. Estimates of soil erosion on farmlands in Utah are given in a table, covering a period of 6 years. Experiments in soil fertility losses, and run-off are detailed.

EAKIN, HENRY M.

(690)

HARMLESS EFFECTS OF EROSIONAL WASTE. *The Land, Today and Tomorrow* 1: 4-7, illus. November 1934.

This article points out that accelerated erosion means accelerated waste and describes soil losses in the southern Piedmont, the Black Lands of Texas, and various sections of the Southwest.

FENNEMAN, N. M.

(691)

CYCLIC AND NON-CYCLIC ASPECTS OF EROSION. *Science* 83: 87-94. January 31, 1936. [Also in *Geol. Soc. Bull.* 47: 173-185. February 1936.]

"The interpretation of erosion in terms of cycles is based largely on the recognition and identification of peneplains. The author also discusses the various associations and origins of peneplains, and emphasizes the "principle of erosion without change of form . . . It has long been known that gullyng of fields is one of the major wastes of our civilization."

FLINT, H. R.

(692)

FOREST FIRES AND EROSION. *Forestry Kaimin* (Mont. Univ. Forestry Club), 103 pp., illus. May 1927.

On pp. 17-18, and 42 the writer points out the erosive effect of a torrential rain on 2,000 forest acres that had been denuded of forest cover by fire. "Probably thousands of tons of ashes, charcoal, lighter surface soil, small stones and pieces of wood were washed off the steep slopes . . . The river just below the burned area turned a dull chocolate brown from the load of sediment and charcoal which it carried . . ."

GILBERT, G. K.

(693)

NATURAL EROSION BY SAND IN THE WESTERN TERRITORIES. *Amer. Assoc. Adv. Sci. Proc.* 23 (11): 26-29. 1874.

An abstract of a paper based on material gathered by the author while in the employ of the United States Engineers. "Sand is efficient in erosion (1) when moved by water, and (2) when moved by air; and in our western territory are to be seen some peculiarly forcible illustrations of both phases of its action. The function of flowing water in denudation is threefold. It dissolves rock; it carries the sand which cuts rock; and it transports the debris . . . Precisely analogous is the action of dry sand carried by the wind." Other phases of erosion by dry sand are described.

GLENN, L. C.

(694)

DENUDATION AND EROSION IN THE SOUTHERN APPALACHIAN REGION AND THE MONONGAHELA BASIN. U. S. Geol. Survey Prof. Paper 72, 137 pp., illus. 1911.

"This report presents a brief summary of the results of an examination of the southern Appalachian region during the field seasons of 1904 and 1905 and of the Monongahela Basin in West Virginia and Pennsylvania in 1907, made for the purpose of studying the effect of deforestation and consequent erosion of the steep mountain slopes on geologic, hydrologic, and economic conditions, both in the mountain region itself and in the surrounding areas through which the many streams that rise in the high Appalachians flow on their way to the Mississippi, the Gulf, or the Atlantic."

GRIFFIN, GERALD.

(695)

SCRAPING OFF SILT TO FIND FARMS. Louisville (Ky.) Courier-Jour., Mag. Sec., p. 8, illus. May 2, 1937.

The author describes the January floods in Mississippi which left tons of worthless topsoil in the form of silt on many farms. Silt used to be a blessing, but sheet erosion and gulying have ruined sloping fields and the subsoil has washed down onto the fertile fields. Sand, scoured out of the river bed or washed from terraces along the rivers where high waters cut into the banks has, in some cases, ruined the farms.

HARGER, H. S.

(696)

SOME FEATURES ASSOCIATED WITH THE DENUDATION OF THE SOUTH AFRICAN CONTINENT. So. African Geol. Soc. Proc., pp. 22-41, illus. January-December 1913.

The writer considers the south African continent from Jurassic times onward. Basing the rate of erosion at 1 foot in 3,000 years, it has taken about 10 million years to reduce South Africa to its present level. "During the degradation of the continent by rivers and their smaller tributaries, important climatic changes appear to have taken place. In the earlier stages of denudation we appear to have passed through a period of much heavier rainfall than is experienced at the present day . . . Evidence points very strongly to a period of great diluvial intensity . . . further evidence of intense denudation due to heavy rainfall is to be seen in the new desert and very dry countries further west." Rivers of considerable size traversed these deserts and are now almost or completely dried up. Eolian erosion, the work of winds in Southwest Africa and the movement of sand dunes are considered.

HARTWIG, L. H.

(697)

LOST: 50,000,000 ACRES. Amer. Mercury 37: 102-104. January 1936.

Destruction of land by erosion represents an annual loss to farmers and ranchers of \$400,000,000, "not including the damage resulting from silting of streams, lakes, and harbors, nor the cost of repairing railways and roads. Erosion is definitely the cause of much submarginal land. Floods, on the other hand, are a direct result, for when the absorptive topsoil has been washed away, the volume and frequency of freshets is proportionately increased by the more rapid flow of rainwater from millions of exposed acres." Erosion is traced in the United States from the coming of the white man. Comparison is made with the Mayan civilization which perished through the results of erosion, and with the fate of many lands in China.

HAVILAND, P. H.

(698)

SOIL EROSION. Rhodesia Agr. Jour. 24: 328-333. March 1927.

"The subject of soil erosion in the Union of South Africa was investigated very fully by the Drought Investigation Commission a few years ago." The Commission stated that "the diminished capacity of the country to hold up and utilise the rain which falls have been caused by the deterioration of its protecting vegetal cover and by soil erosion."

HIGGINS, JAY.

(699)

EROSION IN WESTERN COLORADO. West. Irrig. 14: 8. March 1932.

The following conditions exist: an increase of erosion; overgrazing, resulting in depletion of vegetative cover in certain regions; a marked association between denuded areas and erosion.

- HOBBS, W. H. (700)
THE EROSIONAL AND DEGRADATIONAL PROCESSES OF DESERTS, WITH ESPECIAL REFERENCE TO THE ORIGIN OF DESERT DEPRESSIONS. *Ann. Assoc. Amer. Geogr.* 7: 2560, illus. 1918.
A study of the deserts of northeastern Africa. Treats of the contrasting features of humid and arid lands; the casehardening of rock; sand-blast erosion; evolution of ideas respecting the origin of desert depressions; and the oasis depressions of the Libyan Desert.
- HOC, COLONEL. (701)
CAUSES OF EROSION OF RIVER BANKS. *Engin. and Contract.* 52: 123-125, illus. July 30, 1919.
Causes are attributed to unequal resistance of different parts of the river bed or to deflection of the current from one bank to the other; to centrifugal force of the current which attacks all banks slightly concave; and to deposits in the stream. The author supports his contention by citing the Moselle and Danube Rivers as examples.
- HOLLAND, L. B., AND GLOVER, H. M. (702)
EROSION IN THE PUNJAB HIMALAYA AND ITS PROBABLE EFFECT ON WATER SUPPLIES. *Punjab Engin. Cong. Proc.* 18 (paper 135): 73-82, illus. 1930.
Discusses rainfall and geological features of the region. The effect of forests on rainfall and run-off are also considered. Erosion factors in the inner and outer Himalayas are treated separately.
- HUNTINGTON, E. (703)
PULSE OF ASIA. 415 pp., illus. Boston and New York, Houghton, Mifflin & Co. 1907.
"This book is the record of a journey in Central Asia, and its aim is to illustrate the geographic relation between physical environment and man, and between changes of climate and history." On page 102 the author considers wind erosion: "The areas of sand and lacustrine deposits comprised in the central plain [Lop basin] are notable as examples of the kinds of regions not adapted to life of any form. They are more important as showing that in times past, under different conditions, the same regions were more favorable to life. In the eastern part of the plain, widespread deposits of broken and blistered salt, and beds of variegated clay, proclaim that long ago the lake of Lop-Nor was much larger than now. Farther west, the waste of sand known as the Takla-Makan Desert illustrates the work of the wind, acting upon the materials deposited by the streams in broad flood plains . . . In many places the sands of Takla-Makan have buried the ruins of ancient villages, or the remnants of ancient vegetation . . ." Further examples of aeolian erosion are given in chapter VIII in which the tamarisk mounds, 2,000 years old, formed and fed by the wind, are described. Ch. XVI deals with erosion in Iran, quoting Vredenburg: "In all the valleys around Zara there are to be seen hundreds of stone walls . . . Sometimes they stretch right across the flat, pebbly floors of the great valleys . . . termed 'rivers' . . . The country is quite uninhabitable for want of water, and yet there is no doubt about the nature of these walls . . . being, in fact, nothing but terraced fields. In many cases they still hold back the soil, formerly cultivated, which had been heaped up against them."
- JACOBS, E. C. (704)
FLOOD EROSION AT CAVENDISH. *Science* 66: 653-654. December 30, 1927.
Describes a gully 40 feet deep and 200 feet wide, caused by flood in Vermont.
- JENNINGS, A. C. (705)
EROSION, ESPECIALLY SURFACE WASHING IN SOUTHERN RHODESIA. *So. African Jour. Sci.* 20: 204-207. October 1923.
"In traversing unoccupied parts of the country where human agencies have not been at work, there are, except on steep hillsides, practically no evidence of surface washing or donga [gully] formation . . . The principal form of erosion so far experienced in Rhodesia is . . . surface or sheet washing of cultivated lands; and this, owing to its insidious nature, is undoubtedly one of its worst types . . ."

- JOHNSON, DOUGLAS W. (706)
 PLANES OF LATERAL CORRASION. *Science* 73: 174-177. February 13, 1931.
 Technical study of geologic erosion. Gilbert's statement of the theory of lateral planation is outlined.
- JUDD, C. S. (707)
 AEOLIAN EROSION IN HAWAII. *Amer. Forestry* 23: 239-240, illus. April 1917.
 Overgrazing, causing exposure of soil which trade winds carried out to sea, has left barren the small island of Kahoolawe in the Hawaiian group. "The first step in the plan of reclamation has been to get rid of the wild stock on the island, and during the last eight years over 4,000 goats have been exterminated . . ." Improvement has resulted from increased growth of native weeds, grasses, and mesquite.
- KEIL, P. F. (708)
 TWO CENTURIES OF ACCRUING TRAGEDY ALONG THE DAN RIVER. *Soil Conserv.* 1: 1-6, illus. February 1936.
 Compares conditions that existed 2 centuries ago with those of today. Describes causes of land devastation.
- KELLY, WILLIAM A. (709)
 EROSIONAL RECORD DURING THE PENNSYLVANIA PERIOD AT GRAND LEDGE, MICHIGAN. *Bull. Geol. Soc. Amer.* 43: 276. March 1932.
 "The area in the vicinity of Grand Ledge comprises the most extensive exposures of Pennsylvanian rocks in Michigan. The sandstones, shales, coal seams and the single limestone stratum have an estimated thickness of about one hundred and fifty feet . . . Subdivision and mapping of the strata are facilitated if resort is made to the hypothesis of cyclical sedimentation, as outlined by J. Marvin Weller. There are at least nine cycles represented. Each group of strata has an interrupted distribution as the result of erosion subsequent to a cycle of deposition."
- KEYES, C. (710)
 RATE OF CONTINENTAL DENUDATION. *Science* 40: 933-934. December 25, 1914.
 The writer contends "that the wind-borne dusts from western deserts are alone probably depositing materials over the entire Mississippi Valley faster than the river and its tributaries are carrying rock-waste to the sea." He adds: "Nowhere on earth is there finer exemplification of vast continental sedimentation . . . Growth has exceeded decline a hundred-fold." He believes that elaborate stream measurements give little clue to the absolute rate of continental lowering through erosion.
- KEYES, CHARLES R. (711)
 QUANTITATIVE MEASURE OF DESERT DENUDATION. *Pan Amer. Geol.* 58: 285-300, illus. November 1932.
 After criticizing the present-day geological exploratory expeditions, as trending to unbridled imagination rather than cool scientific judgment, the author considers desert erosion from various viewpoints. "That the erosion of the desert is potent, extensive, and unusually rapid is amply attested by the evidences abounding on every hand . . . It seems probable that we must now regard wind-scour not only the most important erosive agent under conditions of aridity but more potent than all other agencies combined."
- KNIGHT, HENRY G. (712)
 LAND USE AND EROSION. *Amer. Assoc. Adv. Sci., Proc. Land Use Symposium*, pp. 37-43. 1932.
 A paper read at a meeting in Syracuse, N. Y., June 1932. The author discusses the national aspect of soil erosion and estimates the losses to the entire country. The suggestion is made that the problem be placed under State and Federal control. Erosion conditions in Texas and New Jersey are especially noted.

LAWSON, ANDREW C.

(713)

RAIN-WASH EROSION IN HUMID REGIONS. *Geol. Soc. Amer. Bull.* 43: 703-724, illus. September 30, 1932.

After stating the limitations of the problem, the writer goes on to consider the batter of canyon walls, the lowering of rounded hilltops, earlier discussions of convex profiles, the process one of transportation, not corrosion, the straight slope, the occurrence of round-topped hills, the increase of radius of curvature with time, the convex ridge, the dome, the geomorphic tendency of late maturity, and parabolic convexities versus circular.

LEE, L. L.

(714)

THE SOIL EROSION PROBLEM IN NEW JERSEY. *Jour. Amer. Soc. Agron.* 25: 652-660. October 1933.

The geographical provinces, underlying rocks, and topography are discussed, and mention is made of the extremely diversified soils in New Jersey. Erosion is considered in the Piedmont plain, the Appalachian valley, the highlands, and the Coastal Plain.

LINTON, D. L.

(715)

SOIL EROSION: A WORLD PROBLEM. *Scot. Geog. Mag.* 53: 199-202. May 1937.

A general treatise on the rapid acceleration of erosion in recent years throughout the world.

LOWDERMILK, INEZ MARKS.

(716)

FARMERS OF 40 CENTURIES SPEAK TO THE FARMERS OF AMERICA. *The Land, Today, and Tomorrow* 2: 30-33, illus. April 1935. [Also in *La. Conserv. Rev.* 4: 39-40. 1935; and *Save our Soil* 1: 3-4. February 1936.]

The author attributes the present poverty of rural China to the gradual erosion of its land through the centuries and urges that the people of the United States provide for American posterity by intelligent erosion control.

LOWDERMILK, W. C.

(717)

ACCELERATION OF EROSION ABOVE GEOLOGIC NORMS. *Amer. Geophys. Union Trans. Ann. Meeting* 15: 505-509. 1934.

"Treatises on erosion in geological text books are generally restricted to the conspicuous processes evident in arid regions, and to the work of waves and of flowing water in streams . . . Trenching by streams creates erosional potentials for water-action within landscapes; it is response to these erosional potentials that requires our brief examination." The writer discusses the significance of slope profiles, soil creep, importance of relict areas in erosion studies, interdependence of vegetation and soil, geologic norms of erosion, and accelerated erosion.

(718)

FOREST DESTRUCTION AND SLOPE DENUDATION IN THE PROVINCE OF SHANSI (CHINA). *China Jour. Sci. and Arts* 4: 127-135, illus. March 1926.

"Shansi was chosen for the studies upon which this paper is based, because of the existence there of remnants of the former extensive forest cover. Adjacent to the forests were found denuded areas. The processes of converting a forest cover into denuded slopes could thus be studied in the very act." Three different stages in the process of denudation are described. "Exposing the soils on the slopes to the wash of torrential rains has brought about immeasurable ills to the inhabitants through loss of productive soil resources, in the irregular regimen of runoff, and in the reduction of the aggregate food supply."

(719)

FUNDAMENTAL CONCEPTS OF EROSION. *The Land, Today and Tomorrow.* 2: 9-12. January 1935.

The author differentiates between geological normal erosion and accelerated or man-induced erosion and discusses each type.

McCALLIE, S. W.

(720)

DEFORESTATION AND EROSION. *Amer. Forestry* 28: 394-396, illus. July 1922.

"Thousands of acres in this region [Georgia] within the last few years have been made worthless for agricultural purposes by the destructive

agent of rain wash, as a result of the removal of forests." Three practical methods are open to man to retard soil washing: "terracing, deep plowing, and the protection of the forests."

McCRORY, S. H. (721)

REPORT OF THE CHIEF OF THE BUREAU OF AGRICULTURAL ENGINEERING, 1934.
U. S. Bur. Agr. Engin. Rept. 23 p. 1934.

Pages 7-12 furnish data on the progress of soil erosion studies conducted at 10 experiment stations throughout the country.

McDONALD, ANGUS. (722)

EROSION BY WIND AND WATER IN OKLAHOMA. Soil Conserv. 2: 233-235, illus. April 1937.

An account of the struggle in Oklahoma against the ravages of soil erosion. Traces briefly the settlement of the State from 1889 to 1906 and the subsequent erosion resulting from the removal of vegetation. "Erosion appeared first in those areas which were put into cultivation earliest." The trial-and-error method of checking erosion, as practiced by individual farmers, is discussed. "The solutions of individual cases of erosion lose much of their significance when later the enterprising farmer is overwhelmed by erosion caused by his neighbor's neglect."

MALOTT, C. A. (723)

AN ANALYSIS OF EROSION. Ind. Acad. Sci. Proc. (1927) 37: 153-163. 1928.

"In this paper an attempt is made to clearly present the erosive processes and to give the terms which the writer appeared suited to them . . . Distinction is made between weathering and erosion, which are regarded as inclusive terms comprehending two sets of distinct processes which may act separately or in conjunction . . . The various individual processes of each of the great erosive agencies are described under the terms which appear to be well suited to them . . ." Subjects treated are: Weathering and erosion, processes of wind erosion, processes of running water erosion, and glacial erosion.

MARTIN, L., and WILLIAMS, F. E. (724)

AN ICE-ERODED FIORD: THE MODE OF ORIGIN OF LYNN CANAL, ALASKA. Geogr. Rev. 14 (4): 576-596, illus. 1924.

"The Lynn Canal-Chatham Strait fiord is in a mountain region where glacial erosion, stream erosion, change of level of the land, and faulting have all taken place. Its origin may, therefore, be thought to have involved: (1) ice erosion alone; (2) stream erosion chiefly, followed by sinking of the land; (3) stream erosion and glacial erosion, followed by submergence; (4) faulting as a major cause; (5) some combination of all four. It is the purpose of this paper to show that the fiord is due chiefly to glacial erosion and that stream erosion and faulting are of minor importance."

MATTHEWS, E. R. (725)

COAST EROSION AND PROTECTION. 195 pp., illus. London, Chas. Griffin & co. 1918.

Gives a résumé of the erosion and accretion that is taking place around the coasts of Great Britain and Ireland and treats comprehensively all forms of sea defenses, the merits and demerits of each type being discussed. Special consideration is given to methods of construction in reinforced concrete. Comparative costs are given.

MAXWELL, HU. (726)

LAKE MICHIGAN'S ENCROACHMENT ON ITS COAST. Sci. Amer. 120: 687, 699-700, illus. 1919.

"The destruction of land by Lake Michigan has been extremely rapid in comparison with the rate at which seas usually destroy their coast. This high rate of destruction is accounted for by the kind of material washed away and its low power of resistance when attacked by waves." Article shows how the currents are stealing land from the western shore and giving it back at the southern extremity.

- MILLER, M. F. (727)
TEN YEARS OF SOIL EROSION MEASUREMENTS. Amer. Soil Survey Assoc. (Rept. Ann. Meeting. 9) Bull. 10: 29-34. 1929.
Erosion measurements under different systems of cropping and tillage practice at the Missouri Agricultural Experiment Station are presented. "These measurements supply quantitative evidence of the great loss of soil which may take place from erosion . . ."
- MILNE, G. (728)
NORMAL EROSION AS A FACTOR IN SOIL PROFILE DEVELOPMENT. Nature [London] 138: 548-549, illus. September 26, 1936.
Discusses the effects of lateral transport of surface soil material, moved in the course of ordinary slow denudation, on certain soils in Wales.
- MITCHELL, R. H. (729)
SOME OBSERVATIONS ON SLUMPING AND GULLY FORMATION. Science 84: 420. November 6, 1936.
A report of observations made on slippage and gullying of Flag Pole Hill on the campus of Muskingum College in New Concord, Ohio, after a severe rain storm, October 9, 1936. It was found that 170 cubic feet of material moved 3 feet down the slope during and just after this one rain.
- MORGAN, D. N. (730)
EROSION COSTS MONEY. Soil Conserv. Digest 3 (1): 2-5. October 1936. [Mimeographed.]
A study of erosion and rainfall data collected at the Las Posas project in California. Erosion resulting from a severe storm on January 5, 1935, is described.
- MUSGRAVE, G. W., and DUNLEVY, H. (731)
SOME CHARACTERISTICS OF AN ERODED SOIL. Jour. Amer. Soc. Agron. 23: 245-252, illus. April 1931.
A study was made on one of the Texas Blacklands substation acre plots "to determine the more important effects of the common practice of growing cotton continuously and of the accompanying soil erosion upon some of the physical properties of the soil."
- NICHOLS, M. L., and SEXTON, H. D.
SOIL EROSION. Ala. Agr. Expt. Sta. Ann. Rept. 42: 12-13. June 30, 1931.
"Tentative conclusions derived from this year's study" of erosion.
- OLSON, W. S. (733)
CONSERVATION* PROGRESS. THE DIRECTOR OF THE DIVISION OF DRAINAGE AND WATERS TELLS OF THE PROBLEMS AND POSSIBILITIES OF CONSERVATION AS SEEN IN HIS DAILY WORK. Minn. Conservationist 34: 10, 23, illus. March 1936.
General discussion of the importance of conservation of soil, water, forest, and wildlife resources with special reference to Minnesota. "The soil erosion problem of the State affects most seriously the southern highly productive lands, and unless proper control methods are put into practice the time is not remote when much of this land will become useless for agricultural purposes . . ."
- ORAM, H. P. (734)
CONCENTRATED FLOW ERODES ROCK BELOW WILSON DAM. Engin. News-Rec. 98: 190-192, illus. February 3, 1927.
- PATTON, R. S. (735)
PROBLEMS INVOLVED IN COAST EROSION. Mil. Engin. 16: 458-463, illus. 1924.
Beach drifting and the effect of storm waves are discussed. "A comparison of surveys made about 1840 and in 1920 indicates that during the interval the coast of the State [New Jersey] has lost approximately 2,200 acres." Conclusions and 20 recommendations are given.
- PERSON, LOUIS V. (736)
A TEXTBOOK OF GEOLOGY. Pt. 1, 488 pp., illus. New York, John Wiley & Sons. 1929.
Erosion is dealt with under the headings: The Atmosphere: Weathering and Soils, pages 14-42, and Rain and Running Water, pages 43-91. The former deals with the nature and characteristics of different soil types and

their relation to various climatic agencies. The latter discusses the various phases of stream erosion. It also describes the formation of deltas and the development of stream valleys.

POWERS, W. E. (737)

THE EVIDENCES OF WIND ABRASION. *Jour. Geol.* 44: 214-219, illus. 1936.

"In a recent summary of ventifact localities in the United States, the omission of certain regions where wind abrasion is widespread and obvious, indicates that the criteria of this process are often overlooked. Conspicuous examples of wind carving are to be found in the Dells region of Wisconsin and the upper Arkansas River Valley and South Park in the Rocky Mountains of Colorado. Little wind work now occurs in these regions; most of it probably took place under preglacial conditions in the Pleistocene ice age." Accompanying photographs show boulders and granite marked by wind abrasion.

PURDUE, A. H. (738)

A DOUBLE WASTE FROM HILLSIDE WASH. *Resources of Tenn.* 4: 36-37. January 1914.

"Usually, the soil washed from hillsides is carried away by the streams, and no one is the direct sufferer except the owner of the fields that are so carelessly cultivated; but recently the writer's attention was directed to several examples in Wayne County, [Tenn.] in which not only the land of hillsides was destroyed by wash, but the rock from these slopes is spread out over much of the bottom lands, to their destruction." This latter condition is discussed.

RAMSER, C. E. (739)

EROSION EXTENDS RELIEF CHANNEL FAR BEYOND ITS BOUNDS. *Engin. News-Rec.* 94: 391-392, illus. March 5, 1925.

The area considered is Cape La Croix Creek, Mo.

REDDICK, HARRY E. (740)

FREE SOIL FROM A NEIGHBOR'S ORCHARD. *Soil Conserv.* 1: 10-11. August 1935.

Soil washing on California orchards.

RICH, J. L. (741)

RECENT STREAM TRENCHING IN THE SEMI-ARID PORTION OF SOUTHWESTERN NEW MEXICO, A RESULT OF REMOVAL OF VEGETATION COVER. *Amer. Jour. Sci.* (4) 32: 237-245, illus. October 1911.

The author finds that removal of vegetative cover, mainly through excessive grazing, has caused alarming increase of stream trenches produced by floods. "The testimony of settlers is unanimous that, in the early days, there were few trenches in the valley bottoms, and that trenching has followed the appearance of heavy floods."

ROBINSON, G. W. (742)

NORMAL EROSION AS A FACTOR IN SOIL PROFILE DEVELOPMENT. *Nature* [London] 137: 950. June 6, 1936.

Points out two possible examples of the influence of normal erosion, as distinct from catastrophic erosion, on the course of profile development.

ROCKIE, W. A. (743)

SERIOUS EROSION CAUSED BY HEAVY RAIN OF JULY 30, 1931, NEAR COLFAX, WASH. *U. S. Monthly Weather Rev.* 60: 22-23, illus. January 1932.

The area studied is located near the experiment station at Pullman. It is typical of Palouse topography and is characterized by Palouse silt loam soil. Data are given on erosion of slopes bearing different types of vegetation.

(744)

SOME IMPORTANT EFFECTS OF SUMMER FALLOW SYSTEM OF FARMING ON SOIL EROSION IN THE PACIFIC NORTHWEST. *Northwest Sci.* 7 (1): 19-22. 1933.

Discusses three types of soil erosion: (1) Winter erosion; (2) soil drifting in dry lands; and (3) erosion from summer rains. It is the result of studies conducted in the Palouse and the Columbia Basin sections in Washington.

ROCKIE, W. A.

(745)

TONS OF SOIL GO INTO SEA. Wash. Farmer 68 (3): 7, illus. January 19, 1933.

Presents figures on soil losses in the Palouse section of eastern Washington.

(746)

YESTERDAY, TODAY, TOMORROW. Wash. Farmer 67: 3, illus. November 3, 1932.

Contrasts the present eroded condition of various hillside slopes of the Palouse section of eastern Washington and northern Idaho with their productiveness of 25 years ago. Control methods to check the encroachment of erosion are recommended.

W, A., AND MCGREW, P. C.

(747)

EROSIVE EFFECTS OF HEAVY SUMMER RAINS, SOUTHEASTERN WASHINGTON. Wash. Agr. Expt. Sta. Bull. 271, 8 pp., illus. July 1932.

"Violent summer rains are less frequent in the Pacific Northwest than in most parts of the United States, but this region is not immune to their destructive forces. The conditions and results of an individual storm of the type that is infrequent but none the less damaging, are described in this paper . . ."

ROST, C. O.

(748)

FARMING SPEEDS EROSION. Northwest Farm Equipment Jour. 50: 16. June 1936.

"Virgin lands suffer little from erosion. It is only when the natural cover is disturbed or removed to establish agriculture on the land that problems of erosion arise." Estimates by the United States Department of Agriculture on erosion are included.

RUSCH, C. P.

(749)

WILL YOUR FARM DISAPPEAR? Wallaces' Farmer 59: 633. November 10, 1934.

The author contends that the rapid loss of topsoil in all sections of the country where land has been farmed for many years will eventually cause the disappearance of much farm land. A chart indicates the changes in cropping plans that Iowa might adopt to insure a permanent agriculture.

RYAN, WILL.

(750)

VERDICT OF POSTERITY. Calif. Cult. 80: 21, 24. January 14, 1933.

"It is the belief of those who have made studies of the matter that erosion is the greatest menace facing the future of agriculture in this country." Urges California farmers to consider the problem seriously.

SERFONTEIN, J. L.

(751)

EFFECTS OF SOIL EROSION IN SOUTH AFRICA. Farming in So. Africa 5: 55-56, 62. May 1930.

The author discusses the effects of erosion on South African lands, pasturage, stock, population, and general economic conditions.

(752)

SOIL EROSION IN SOUTH AFRICA. Farming in So. Africa 5: 13-14. April 1930.

The author deals with the value of the soil, the manner in which erosion takes place, and its chief causes.

SHAW, C. F.

(753)

IS NATIONALISM PROMOTING EROSION? Geogr. Rev. 26: 149-150. January 1936.

The uplands of Great Britain, now being plowed for crop acreage, are discussed. The author contends that erosion is active on all these upland soils, and that the national program for self-sufficiency should plan agricultural activities on a soil-preserving basis.

- SHELDON, PEARL.** (754)
SIGNIFICANT CHARACTERISTICS OF GLACIAL EROSION AS ILLUSTRATED BY AN EROSION CHANNEL. *Jour. Geol.* 34: 257-265, illus. 1926.
"A channel produced by glacial erosion following the outcrop of a dike lies like a groove along the side of a large, deep valley. This grooving resulted from the differential erosion of a band of comparatively weak rock made up of weathered kimberlite from the dike and the contact jointing zones on each side of the intruded rock. Active differential movement within the ice is indicated as permitting and facilitating the erosion processes. Plucking was particularly effective and different phases of this process could be determined. Deductions regarding the depth of glacial erosion are based on the conditions observed."
- SHORT, A. K.** (755)
ESTIMATED SOIL LOSSES. *Farm and Ranch* 51: 7. December 15, 1932.
A short review of a report of Secretary of Agriculture Arthur M. Hyde to President Hoover giving data on annual soil losses.
- SINCLAIR, J. D.** (756)
EARLY OBSERVATIONS ON SOIL WASTAGE IN MISSISSIPPI. *Forest Worker* 6: 19. November 1930.
Excerpts from a report on the geology and agriculture of the State of Mississippi by the State geologist, published in 1857, are given.
- SOBOLOV, S. S.** (757)
EROSION ON THE TERRITORY OF THE UKRAINIAN S. S. R. *Pedology* 3: 321-343. 1937. [In Russian with English Summary.]
There are three types of erosion in the Ukraine: river erosion, ravine erosion, and denudation. Methods of mapping all three are described.
- STALLINGS, J. H.** (758)
MENACE OF SOIL EROSION. *Amer. Water Works Assoc. Jour.* 27: 513-519. April 1935.
"Careless, haphazard, erosion-inducing farm practices of tillage and cropping have taken severe toll of our good farm areas . . . This wastage is proceeding in America faster than with any race or people, civilized or barbaric, in the history of the world. Land deterioration has very markedly influenced, and even determined, the actual destinies of nations." Surveys and soil-erosion experiments through the Piedmont and from Oklahoma to California are dealt with at length.
- STANTON, F. W. S.** (759)
EROSION OF THE COAST AND ITS PREVENTION. 68 pp., illus. London, St. Bride's Press, Ltd. 1909.
In 4 parts: Part 1 consists of general observations on the difficulties encountered in checking the perennial encroachment of the sea on the east coast of England; part 2 deals with the causes of erosion and its extent in various seaports of England; part 3 discusses engineering structures to check coast erosion; and part 4, an appendix, describes the physical formation of the Thames estuary.
- STARKER, T. J.** (760)
EROSION TAKES HUGE TOLL. *Oreg. Farmer* 57: 6, illus. August 23, 1934.
"One of the greatest factors in soil erosion is the amount of precipitation and the period over which it falls . . ." Recommendations for proper soil cover to prevent ruinous washing are made.
- SUNDERLIN, H. H., AND CLYDE, A. W.** (761)
SURFACE EROSION AND HILLSIDE DITCHES. *Iowa Agr. Col. Ext. Bull.* 93, 4 pp., illus. May 1922.
"The removal of the top layers of soil is a more serious problem than is generally realized." Surface erosion is discussed with regard to organic matter, deep plowing, and contour farming. Hillside ditches are discussed with regard to sod strips, and tile drains.
- TARR, R. S.** (762)
EROSIVE AGENTS IN THE ARID REGION. *Amer. Nat.* 24: 455-459. May 1890.
"Thus it will be seen that the great agent of erosion, water, is of particular importance in the arid regions on account of its intensified action

during brief periods; that the direct effect of aerial currents is a powerful factor in the erosion of these plateaux; that the sun's heat must also play an important part; that plants are only slightly conservative and slightly destructive; and that animals, by tramping down the soil or by burrowing and tunnelling into the earth, are important aids in the great work of subaerial denudation by which the plateaux of the West are being gradually eaten away."

TERZAGHI, K.

(763)

EARTH SLIPS AND SUBSIDENCES FROM UNDERGROUND EROSION. Engin. News-Rec. 107: 90-92, illus. July 16, 1931.

"The most impressive subsidence and slip due to underground erosion with which the writer has had direct experience occurred on the high bank of the Mississippi River at Memphis, Tenn. . . ." Similar processes are considered a possible cause of the failure of the Corpus Christi Dam.

THOMPSON, M. W.

(764)

EROSION IN THE BLACK HILLS AFTER THE BURNING OF THE FOREST COVER. U. S. Dept. Agr. Yearbook 1935: 181-184, illus. 1935.

"A notable example of severe erosion immediately following the destruction of the forest cover by fire, in contrast with the very satisfactory protection afforded by forest cover on an adjacent area, is found near Rochford in the Black Hills National Forest, S. Dak. The destruction of the protective cover was the only change that occurred prior to the time the erosion took place—all other factors remaining unchanged. Here the direct relationship between the removal of forest cover and subsequent erosion is clearly demonstrated."

UDDEN, J. A.

(765)

EROSION, TRANSPORTATION, AND SEDIMENTATION PERFORMED BY THE ATMOSPHERE. Jour. Geol. 2: 318-331. 1894.

The author contends that the subject of this paper has not received any general and searching attention from geological students in this country. "This is the only excuse for presenting . . . a few considerations bearing on the topic. I take the liberty to state in a dogmatic way what appear to me to be some laws governing aerial erosion, transportation and sedimentation in general . . . As an agent of erosion air is far less efficient than water.

UNITED STATES CONGRESS. HOUSE COMMITTEE ON APPROPRIATIONS.

(766)

SOIL EROSION INVESTIGATIONS. Hearing . . . on Agriculture Department Appropriation Bill for 1936, 74th Cong., 1st sess., pp. 1243-1248. 1935.

An explanation of the soil-erosion item in the bill is given, as allotted to the several bureaus. Work done under this appropriation, and the work of seven projects under the "National program of erosion-stream flow investigation on forest and range lands," is outlined. Work done under the allotments to the Bureaus of Chemistry and Soils and Agricultural Engineering is described.

UNITED STATES WEATHER BUREAU.

(767)

EROSION DUE TO HEAVY RAINS AND STEEP GRADES. U. S. Monthly Weather Rev. 28: 544. December 1900.

"The deepest and most precipitous canyons occur in regions that have but little frost and only occasional but heavy local rains. In these regions a comparatively small watershed of very steep gradient carries a mass of water downward with such force as to do far more erosion and other damage than if the same rain were spread over a longer period of time"

VER STEEG, KARL.

(768)

EROSION SURFACES OF THE APPALACHIANS. Pan Amer. Geol. 56: 267-284, illus. November 1931.

"During the past four years the writer has spent considerable time in the field and in the laboratory studying the Appalachian region, especially in New Jersey, Pennsylvania and eastern Ohio. It was obvious in the beginning that a study of the northern Appalachian region without the southern portion was inadequate to anyone wishing to obtain a correlation of erosion-surfaces. In consequence of work done recently in the southern Appalachians, a tentative correlation is here presented."

CONSERVATION IN GENERAL

ANONYMOUS.

(769)

ADJUSTMENT IN THE YEARS TO COME. Fert. Rev. 10: 10-11, illus. 1935.

The writer refers to President Franklin D. Roosevelt's statement that the policy of the A. A. A. in the future would place even greater emphasis on the improvement of soils through the use of adjusted acres for soil-improving and erosion-preventing crops. Balanced production and soil-saving grasses are discussed.

(770)

AFTER AAA—"SAVE THE SOIL." Business Week, pp. 8-9. January 18, 1936.

ANNOUNCE 1937 CONSERVATION RATES. Calif. Cult. 84: 85. January 30, 1937.

Rates of payments which California farmers may earn for soil- and range-building practices under the 1937 program are listed under 22 items on grasses and legumes.

(772)

BANKS REQUIRE FARM EROSION PREVENTION. Engin. News-Rec. 104:358. February 27, 1930.

"Alarmed by the rate at which soil is being washed down rivers to sea, some of the Federal Land Banks are making conditions on loans specifying steps to be taken to prevent erosion. All banks are being asked to co-operate in the effort to keep the soil in its place."

(773)

THE BOY CARRIED THE STORY HOME. South. Planter 97: 31, illus. December 1936.

A description of the way in which a South Carolina farmer is following a soil erosion-control program recommended by the Soil Conservation Service. Terraces, meadow strips, and the kind of plow utilized are described.

(774)

CAUSE AND CURE OF DUST-BOWL PROBLEMS. Market Growers Jour. 60: 270-271, illus. May 15, 1937.

"This is a story in which the text explains the cause or chief cause of the so-called 'Dust-Bowl' and the pictures show the cure or one of the cures."

(775)

COMPREHENSIVE PROGRAM IS STARTED TO PREVENT SOIL EROSION AND PROVIDE FLOOD CONTROL. West. Construct. News 10: 72-74, illus. March 1935.

The soil erosion service program is outlined showing distribution of \$20,000,000 P. W. A. allotment for reclamation of 35,000,000 acres of eroded land. "Effective control of erosion can be accomplished in the project areas through such measures as contour ditches, check dam construction, strip cropping, reforestation, and revegetation of the steeper denuded slopes."

(776)

CONGRESS ACTS ON NEW FARM BILL; SOIL CONSERVATION PROGRAM PASSES THE SENATE 56-20 AND HOUSE 267-97. Wallaces' Farmer 61: 3, 7. February 29, 1936.

Benefits deriving from the new farm bill amending the Soil Conservation Act are stated as: (1) Providing cash payments to the farmer for participation in a soil-conserving program on his own farm; (2) shifting grain acreage into pasture and so preventing overproduction and price drop in grains; (3) aiding livestock prices by preventing the overproduction that always follows cheap grain; and (4) providing for Federal purchase of surplus livestock products for distribution to unemployed.

(777)

CONSERVATION OR SUBTERFUGE. Country Gent. 106: 20. November 1936.

"The advisory and demonstrational activities of the State colleges and the Federal Soil Conservation Service . . . are of incalculable value . . . but the actual work of saving the soil will have to be done by local agencies."

ANONYMOUS.

(778)

THE CONTROL OF SOIL EROSION IN THE UNION OF SOUTH AFRICA. Rhodesia Agr. Jour. 33: 11-17. January 1936.

This article explains the various systems and schemes used to combat soil erosion in South Africa.

(779)

THE DANGERS OF SOIL EROSION AND METHODS OF PREVENTION. Rhodesia Agr. Jour. 32: 533-542. August 1935.

Describes the main types of erosion and gives considerable data on donga, or gully control. Sheet-erosion control is also discussed. Chief methods described are storm drains, embankments, and ridges.

(780)

DECREASED FOREST AREA CONTRIBUTES TO SEVERITY OF FLOODS IN INDIANA. WOODED AREA IN STATE REDUCED SEVENTY-FIVE PERCENT RESULTING IN MORE RAPID RUNOFF AND INCREASED SOIL EROSION. Outdoor Ind. 4: 19, 24, illus. March 1937.

Recommends as control measures the reforestation of submarginal farm land or land where the slope is too great for profitable farming; the construction of many hundreds of small dams rather than concentration on a few large ones; and greater soil-conservation and flood-control cooperation from the individual farmer.

(781)

EARTH DISEASE. Survey Graphic 25: 302. May 1936. [Adapted from "Little Waters: Their Use and Relation to the Land", by H. S. Person, with the cooperation of E. Johnston Coil and Robert T. Beal.]

Outlines the action necessary for the prevention of "earth disease", i. e., lost topsoil, gullied slopes, dry watercourses, dust storms, and floods.

(782)

FARM PROGRAM IS NOT REALLY NEW. SOIL CONSERVATION HAS BEEN USED FOR 60 YEARS. Kans. Farmer 74: 6. April 25, 1936.

The writer explains the soil-building payment plan and the present outlook for Kansas farmers in the matter of acre compensation.

(783)

FARMERS' EXPERIENCE LETTERS. Prog. Farmer (East. Ed.) 34: 1201. July 26, 1919.

The broad terrace, rotational crops, the use of legumes and other plants as an aid to soil building are the subject of these letters.

(784)

FARMERS WHO ARE OVERCOMING SOIL EROSION. Farming in So. Africa 6: 49-50, illus. May 1931; 6: 195-197, illus. August 1931.

A series of abstracts of letters from farmers describing methods successfully employed by them in overcoming soil erosion. "It is hoped that the example of those who are doing their share (and with direct benefit to themselves) will stir into similar activity their brother farmers who have not yet . . . realized their responsibility in saving their properties from soil erosion." Various plants, suitable for planting in the bed of and upon the banks of small gullies and streams and rivers, for the purpose of soil binding and soil building are listed.

(785)

FERTILIZING AND SOIL EROSION. Science 80 (Sup.): 6-7. November 23, 1934.

Stresses the importance of fertilizing and liming soil to increase crop yields and to decrease erosion of topsoil.

(786)

GONE WITH THE WIND. Work 1: 30-31, illus. November 1936.

Tells what the Soil Conservation Service in cooperation with the Civilian Conservation Corps and Works Progress Administration is doing to check erosion. Quotes estimates on soil losses from the writings of H. H. Bennett.

ANONYMOUS.

(787)
GOVERNMENT ACTS TO STOP SOIL LOSSES. Wis. Agr. and Farmer 61: 5. June 9, 1934.

An account of the Coon Valley soil-erosion program in western Wisconsin.

(788)
HIGHWAY CUT AND FILL SLOPES TREATED TO CHECK SOIL EROSION. Engin. News-Rec. 116: 43-44, illus. January 9, 1936.

In the Norris Dam Reservoir area, the Tennessee Valley Authority applies erosion-control technique along highways by fertilizing, seeding, and mulching with brush or straw.

(789)
IS YOUR FARM GOING TO SEA? Amer. Agr. 132: 5. June 22, 1935.

The writer describes the erosion-control demonstrations in Steuben County, N. Y., conducted by the Soil Conservation Service.

(790)
KEEP HILLSIDES FROM WASHING. Farming 19: 305. March 1921.

Information on soil erosion, its causes and effects, is quoted from bulletins published by the University of Wisconsin and the Mississippi Extension Service, respectively. The losses to farmers annually from soil washing and preventive measures are discussed.

(791)
LAND EROSION IN INDIANA CHECKED BY FORESTATION. Engin. News-Rec. 108: 462, illus. March 31, 1932.

A practical example of treatment on gullied slopes in Clark County, Ind., is presented. "With this experience as an object lesson, a crew of men worked at the Morgan-Monroe forest, filling gullies with brush, and planting black-locust seedlings and pines on the eroded fields." The cost of control was estimated at about \$12 per acre on gullied land.

(792)
LARGE EROSION CONTROL PROJECT TO BE STARTED IN ARIZONA. Engin. News-Rec. 113: 478. October 11, 1934.

The area for the Arizona and New Mexico project involves 8,000,000 acres in the drainage basin of the Gila River.

(793)
LOCUST TREES RECOMMENDED TO PREVENT SOIL EROSION. Pract. Farmer. 112: 186. May 1, 1916.

"The gulling of land can be checked by planting trees . . ." The spreading, compact root system of the black locust tree is recommended as a soil binder.

(794)
THE MENACE OF SOIL EROSION. (Editorial.) Trop. Agr. [Trinidad] 11: 77-79. April 1934.

Reference is made to a series of articles on soil erosion by T. Eden, in which he forcibly stresses the menace of erosion in relation to the general question of the maintenance of soil productivity. "The relationship between water run-off, rate of soil erosion, and surface gradient has been critically investigated." Three general methods of combating this menace are discussed.

(795)
MILLIONS TO FARMERS WHO SAVE SOIL. (Editorial.) Wallaces' Farmer 61: 247, 258-259. March 28, 1936.

The new A. A. A. program of national soil conservation provides \$120,000,000 in benefits for farmers of the Middle West who cooperate. What individuals must do to help this program is discussed along with other aspects of the program.

ANONYMOUS.

(796)

NATIONAL SOIL CONSERVATION PLAN IS ANNOUNCED BY WALLACE. Com. Fert. 52: 11-15. May 1936.

This article outlines the terms of the soil conservation program for 1936, as announced by Secretary Wallace. The salient points of the program including agreements, soil-building, and soil-conserving payments are explained. A review is also given of the administrative organization, organization in States and counties, and a preliminary classification of crops.

(797)

NEW LIGHT ON SOIL EROSION. Farm and Ranch 53: 24. July 1, 1934.

Some observations on the findings of the Soil Erosion Experiment Station No. 4 near Tyler, Tex. Information is given on crops to check erosion, gully control by Bermuda sod bags, strip cropping on terraces, and closed-end level terraces.

(798)

NEW PROGRAM FOR CONSERVING SOIL. Wallaces' Farmer 61: 4, 8. December 19, 1936.

A discussion of the Soil Conservation Service program for 1937 showing how the farmer may benefit by cooperating.

(799)

ONE WAY TO STOP SOIL WASHING. Power Farming 27: 43. February 1918.

The reason for excessive wash of the rich and fertile soil around Griffin, Ga., is the underlying red clay which is impervious to water penetration. The author cites an experiment made in 1916 "Two of the three washes were subsoiled with dynamite while the third was left as a check. The idea in blasting along the sides of the wash and back of the terraces was to break up the hardpan." Wheat planted on the blasted sections was found to yield 20 percent more than did the rest of the field.

(800)

PLAINS WILL GROW TREES WITH RUN-OFF WATER. Farmer-Stockman 50: 22, illus. January 15, 1937.

On the wind-erosion control project east of Dalhart, Tex., trees are being set in natural sites and in engineered sites where water collects naturally or by diversion of natural run-off.

(801)

PREVENTABLE SOIL EROSION IMPOVERISHING NATION'S FARMS. Manfrs. Rec. 98: 42. September 18, 1930.

This editorial stresses the need for contour plowing and terracing to control erosion and conserve moisture. "... it is encouraging to know that soil erosion prevention methods are beginning to show results."

(802)

THE PROBLEM OF SOIL CONSERVATION ON LANDS ADJACENT TO MAIN ROADS. Rhodesia Agr. Jour. 34: 142-145, illus. February 1937.

A treatise on highway erosion and its control in Rhodesia. A sketch shows a suitable lay-out which facilitates delivery of storm water to road drains without erosional damage.

(803)

THE PURPOSE OF UP-STREAM ENGINEERING AND ITS HOPE. Outdoor America 2: 4-5, 11, illus. November 1936. [Reprinted from the Young Executive, official publication of the Junior Chamber of Commerce, by permission of the publishers.]

"Up-stream engineering is the engineering of multitudinous little structures and of proper land use . . . The time has come when both the rural and urban dweller must unite in a fight to save American soil . . ."

(804)

R. U. BLASINGAME TELLS ABOUT THE FARM POWER CONTRACTOR. Pa. Farmer 116: 5, 17, illus. January 2, 1937.

Figures show how a farm-power contractor can function in a community to aid farmers. Costs of terracing pasture land are given.

ANONYMOUS.

(805)

SAVING OUR SOIL, HARNESSING THE UPS AND DOWNS OF DAIRYLAND. Hoard's Dairyman 82: 177, 201, illus. March 25, 1937.

The engineer's part in saving the soil is stressed, and a number of recommendations by a representative of the Soil Conservation Service in Wisconsin are listed. Among them are terracing, strip cropping, and gully control.

(806)

SAVING SOIL BY DYNAMITE. Lit. Digest 56: 24. March 2, 1918.

Experiments reported from Griffin, Ga., show that the force of a high explosive may be used to save as well as to destroy. On one farm on which experiments were carried out the land was rolling and the soil typical of the section. Two bad washes in one field were blasted in order to effect vertical drainage. The unblasted one suffered soil erosion later, but the other two were seeded to wheat and resisted downpours and consequent erosion.

(807)

SAVING TOMORROW'S AGRICULTURE. Save Our Soil 1 (5): 1, illus. 1936.

Numerous advantages that would result from a well-coordinated erosion-control policy are listed.

(808)

SCHEMES FOR SOIL-EROSION CONTROL AND WATER CONSERVATION. Farming in So. Africa 12: 169, 171. April 1937.

Brief summary of five schemes under which government assistance is afforded for the control of soil erosion and the building of small dams for water conservation in South Africa.

(809)

SCS WORK TESTED. (Editorial.) West. Farm Life 38: 4. June 1, 1936.

Attention is called to "the first important test of some of the wind and water erosion prevention practices being advocated and demonstrated by the Federal Soil Conservation Service." It is stated that watershed dams, contour farming, terracing, and diversion ditches constructed in Powers and Baca Counties, Colo., proved successful to control run-off during and after a 24-hour precipitation. "The results are not only gratifying to the Service but are encouraging to landowners who are planning to carry out similar soil-retaining practices on their own ranches."

(810)

SHARE CROPPING WITH OLD MAN EROSION. (Editorial.) Prog. Farmer (Tex. Ed.) 51: 5. September 1936.

This editorial discusses results of an experiment conducted at the University of Georgia to determine loss of plant-food value by soil erosion. "A comparison was made between 115 pounds of soil washed from an acre of woodland in a year and 11,316 pounds (56 tons) eroded from the same area of typically bare soil in the same time . . . On the woodlands only 3 pounds of plant food valued at 5 cents was lost. To replace them would require only $\frac{1}{2}$ pound nitrate of soda, 1 pound superphosphate and $1\frac{1}{2}$ pounds muriate of potash. But to replace the plant food lost in the 56 tons of soil washed from the acre of bare ground, the farmer must spend \$8.75 for 450 pounds of nitrate of soda, \$12 for 1,100 pounds of superphosphate and \$38.40 for 1,700 pounds muriate of potash. Had these washed plant foods stayed in the soil, they would have been sufficient to make an acre of land yield 50 bushels of corn for four separate seasons."

(811)

\$6,000,000 TO COMBAT EROSION. Ariz. Prod. 12: 5. December 15, 1933.

Launching of the large Government projects on the Navajo Reservation and Gila watershed are summarized.

(812)

SOIL AND WATER CONSERVATION. Engin. News-Rec. 117: 478-480. October 1, 1936.

"Upstream Engineering Conference in Washington discusses many subjects related to the conservation of soil and water at the headwaters of

rivers; lack of adequate engineering condemned." Brief summaries of papers of the conference held September 22 and 23, 1936, are presented. Topics emphasized are watershed moderators, soil-erosion studies, the beaver—(first upstream engineer), erosion losses, types of flood control, surface runoff control, weather cycles, farm ponds in Kansas, use of small dams, and "dry lakes."

(813)

SOIL CONSERVATION IN WISCONSIN AND MINNESOTA. A HISTORY OF EROSION CONTROL WORK IN THE DRIFTLESS AREAS. *Save Our Soil* 1: 1-2, 4, illus. March 1936.

Describes the work of the Soil Conservation Service in the Northwest in cooperation with the Civilian Conservation Corps.

(814)

SOIL CONSERVATION MOVES FORWARD. (Editorial.) *Wallaces' Farmers* 61: 319, 329. April 25, 1936.

Discusses the soil conservation program for 1936, particularly the conditions under which contracts are entered into. A soil-conserving crop list is given; questions and answers bearing on vital points are included.

(815)

SOIL EROSION. *Farming in So. Africa* 5: 441. December 1930.

Attention is called to the need to prevent losses caused by soil erosion. The importance of maintaining a good vegetative cover, terracing, and the use of dams to reclaim gullies are stressed. "Half the battle against soil erosion lies in prevention."

(816)

SOIL EROSION CONTROL IN THE TENNESSEE VALLEY. *Explosives Engin.* 12: 230-231, illus. August 1934.

"The general method of erosion control is to restore a vegetative cover." This phase of T. V. A. conservation work in remedying the damage done to land robbed of its natural protection is discussed. A tabulated summary of the accomplishment of the C. C. C. units for a 6-month period is given.

(817)

SOIL EROSION IN CEYLON. *Trop. Agr. [Ceylon]* 76: 314-316. May 1931.

This is a review of the report of the committee on soil erosion (Ceylon Sessional Paper III of 1931, Govt. Record Office, Colombo.) "The Committee made exhaustive enquiries into the state of affairs existent in Ceylon by visiting all the important planting districts and inspecting agricultural works, irrigation works, village settlements, and forest clearings . . . Estates, small holdings . . . forest clearings, are considered seriatim and the measures taken to combat soil erosion on each of these forms of cultivation are enumerated at length. The external evidence of erosion in the silting of estates and paddy fields, the damage to irrigation works, roads and railways, the silting and flooding of rivers is also described . . . The views of the Committee form the subject of a separate chapter."

(818)

SOIL EROSION SERVICE. *Science* 78: 596. December 29, 1933.

The work on a 200,000-acre erosion-control project in north-central Missouri is described.

(819)

SOIL EROSION SERVICE PLANS LARGE-SCALE OPERATIONS. *Engin. News-Rec.* 111: 644. November 30, 1933.

Areas selected for the demonstration programs by the Soil Erosion Service are given. These areas are the upper Mississippi Valley near La Crosse, Wis.; north-central Missouri; south-central Iowa; central and southern Illinois; Black Belt of Texas; South Carolina Piedmont; Palouse wheat belt near Pullman, Wash., extending over into Idaho; southern California; Oklahoma; Navajo and Hopi Reservations in Arizona; New Mexico; and Utah.

ANONYMOUS.

(820)

THE SOIL STAYED PUT. Pacific Rural Press 133: 631, illus. May 8, 1937.

An important soil-management problem on a 62-acre peach orchard at Cucamonga, San Bernardino County, Calif., and the way it was solved.

(821)

STEPS TOWARD EROSION CONTROL. Standard Oil Bull. v. 23, pp. 11-13, illus. November 1935.

A description of erosion-control work in the Southwest by the Soil Conservation Service in cooperation with other public authorities and with private individuals.

(822)

STUDY EROSION CONTROL ON BUREAU ROAD PROJECT. Pacific Road Builder and Engin. Rev. 44: 21, illus. April 1936.

This is a report of erosion-control experiments conducted on several large fills on the 5-mile unit of Angeles Crest Highway in Los Angeles County, Calif. Brush was placed between fill layers during compaction, and hay was placed at the bottom of the fill to cut down volume and rate of flow, reduce water concentration, and bind the surface. Illustrations show erosion-control work on the fill.

(823)

THIS LOSS OCCURS WHERE THIS IS PRACTICED. Wash. Farmer 60: 3, illus. May 16, 1935.

Describes the costs per acre of controlling erosion on the average farm in the Palouse wheat belt and discusses the work and program of the Pacific Northwest Soil Erosion Experiment Station at Pullman, Wash.

(824)

TO STOP SOIL EROSION LOSSES. Sci. Amer. 145: 97, illus. August 1931.

The writer discusses the findings of Henry G. Knight, who visited regional erosion-control stations of the Department of Agriculture at Bethany, Mo., and Pullman, Wash., outlines control methods, and shows that the western farmer is becoming rapidly aware of the necessity of coping with the problem.

(825)

TWO QUESTION ON NEW PROGRAM. Wallaces' Farmer 62: 8. January 2 1937.

"When farmers attend community meetings this month, to learn about the 1937 soil conservation program, one feature of special interest will be the neutral crops classification. Under this provision, certain soil depleting crops, when handled in specific ways, will be regarded as neutral and may be used to take the place of killed-out seedings of soil conserving crops. Two questions undoubtedly will arise at all meetings: What is the acreage limit on such substitution? What soil depleting crops will qualify and how must they be handled?" Both questions are discussed.

(826)

WHAT IS CONSERVATION? Amer. Forests 16: 423-425. July 1910.

A reply to some of the sharp attacks on the advocates of conservation. "Conservation . . . means use, wise use, determined by the actual needs of the people . . . it denies the primary right of a few individuals to use for their private and personal gain the resources of the people." Concrete examples are given of deforestation and devastation of public lands.

(827)

WINNING COUNTY AGENTS TELL OF BATTLE TO LESSEN SOIL EROSION. Fert. Rev. 4: 8-11. February 1929.

The author quotes Dean I. O. Schaub, of the North Carolina State College: "The greatest factor that limits production is soil erosion. If you ride from Raleigh to New Orleans you can almost pick out the counties that have county agents by observing the localities where the fields are terraced . . ." A review is given of the program of six county agents whose success in erosion control gained considerable recognition.

ANONYMOUS.

(828)

WISCONSIN 4-H BOYS DOING GOOD WORK TO STOP EROSION. Wis. Agr. and Farmer 64: 3, 8, illus. January 30, 1937.

Describes the work of 77 members of 4-H Clubs in several Wisconsin counties on erosion-control projects.

AKERS, B. H.

(829)

FARMING THE SUBSOIL. Farmer and Farm, Stock and Home 52: 3, 18, illus. July 21, 1934.

Discusses experiments in erosion control at the La Crosse Experiment Station in Wisconsin. Studies were in strip cropping and terracing, both involving contour cultivation.

ALLRED, B. W.

(830)

LOCAL GROUPS AID SOIL EROSION WORK. West. Farm Life 38: 8, 23. June 1, 1936.

Discusses the cooperation of Colorado farmers and stockmen with the Soil Conservation Service, in organizing local county associations for promotion of erosion-control programs.

ALLRED, C. E., AND ESRY, D. H.

(831)

SOIL CONSERVATION PRACTICES IN ACTUAL USE BY FARMERS; EASTERN HIGHLAND RIM, 1932-1936. U. S. Works Progress Administration Monog. 28, 38 pp., illus. 1937. [Mimeographed.]

The following soil conservation practices are described: Cropping systems; limestone; commercial fertilizers; manures; contour tillage and furrowing; strip cropping; diversion ditches; protected waterways; mechanical structures for gully control; terracing; and natural reforestation. A list of plants suitable to the section (Overton County, Tenn.) is given.

AMES, C. T.

(832)

SOIL EROSION. Miss. Agr. Expt. Sta. Bull. 165: 3-12, illus. 1914.

"Experiments at the Holly Springs substation farm on the prevention of soil erosion are described . . . The laying off and construction of terraces is also described."—Expt. Sta. Rec. 32: 514. 1915.

ANSTEAD, R. D.

(833)

THE PREVENTION OF SOIL EROSION ON TEA ESTATES IN SOUTHERN INDIA. Trop. Agr. [Ceylon] 61: 153-155. September 1923.

Methods for stopping soil erosion in a practical and economic manner have been adopted with success on many estates in southern India. The first is a modification of the terracing work done in Java, and the second is "to abandon forking and clean weeding on very steep slopes, and to keep the soil covered all the time by some selected weed . . . The choice of evils, lying between keeping a cover of weeds on steep slopes and allowing them to be washed by the heavy Monsoon rains is largely in favor of the weeds."

(834)

THE PREVENTION OF SOIL EROSION ON TEA ESTATES IN SOUTHERN INDIA. Agr. Jour. India 14: 787-790. October 1919.

Describes two methods. The first is a modification of the work done in Java, and the second is the establishment of "particular" weeds by selective weeding.

ARKANSAS COLLEGE OF AGRICULTURE EXTENSION SERVICE.

(835)

TYPES OF FARMING IN ARKANSAS. Ark. Agr. Col. Ext. Cir. 351, 76 pp. 1936.

For each of 12 areas, information is given as to climate, soils, and soil erosion, land use and crops, types of farms, and recommendations for improvement, among which are mechanical control of erosion by terraces and contour farming; use of winter cover crops; idle or abandoned land restocked with timber or improved pasture; steep slopes permitted to remain in woodland; and crop rotation.

ARKANSAS STATE PLANNING BOARD.

(836)

PROGRESS REPORT . . . NOVEMBER 1936. Ark. State Planning Bd. 244 pp., illus. 1936.

The section devoted to soil erosion, pages 44-45, includes the recommendations that, (1) the State, through some suitable department or agency,

avail itself of the facts and experience obtained by the United States Soil Conservation Service through its demonstration projects in Arkansas; (2) a long-term State-wide soil conservation program be evolved through the cooperation of individual farm operators.

ARMSEY, SIDNEY P. (837)
LIME AS A FACTOR IN SOIL CONSERVATION. *Soil Conserv.* 1: 9. November 1935.

ASSOCIATION OF SOUTHERN AGRICULTURAL WORKERS. (838)
PROCEEDINGS; ABSTRACTS OF PAPERS AND ADDRESSES AT THE 37TH AND 38TH ANNUAL CONVENTIONS 1936-1937. 313 pp. Atlanta, Ga. 1937.

At the symposium on soil and water conservation, 37th annual convention, Jackson, Miss., February 5-7, 1936, the following papers were given: Soil Conservation Program in the Southeastern States, by T. S. Buie, pp. 22-23; Some Phases of Vegetative Control in the Soil Conservation Program, by Ernest Carnes, pp. 23-24; Terracing Machinery and Terrace Construction Practices, by R. W. Baird, pp. 24-25; The Relation of Pasture Management to Soil Conservation, by R. E. Penn, pp. 25-26.

At the 1937 symposium, Nashville, Tenn., February 3-7, the following papers were included: The Interest and Responsibility of Agriculture in the Protection of Stream Flow, by C. R. Hursh, pp. 172-174; Meadow Strips, by A. H. Veazy, p. 174; The Place of Kudzu in Southern Agriculture, by R. Y. Bailey, pp. 175-176; Making Use of the Forest and Forest Trees in a Program of Erosion Control, by Richard Kilbourne, p. 176. Other papers of interest in this volume are: Research Procedure, by M. L. Nichols, pp. 34-35; Soil Conservation in an Improved Agriculture, by M. F. Miller, pp. 51-52; Marketing the Farmer's Timber Crop, by D. E. Lauderburn, pp. 112-113; The Relation of Soil and Water Conservation to a Land-Use Policy for the South, by H. V. Geib, p. 186; The Place of Legumes in a Soil Conservation Program, by T. S. Buie, pp. 204-205.

ATLANTA & WEST POINT R. R. AGRICULTURAL DEPARTMENT. (839)
SOIL EROSION PROGRAM IN LEE COUNTY, ALA. Atlanta & West Point R. R. Agr. Bull. 1936: 18, illus. Spring ed. 1936.

SOIL IMPROVEMENT DEMONSTRATIONS. Atlanta & West Point R. R. Agr. Bull. pp. 3-7, illus. Spring ed. 1935. (840)

"The soil improvement demonstrations conducted by the Agricultural Department of these railroads have continued to show good results during the sixth year of their operation." Yields from winter legume demonstrations are quoted for Georgia and Alabama, and the cost of terracing is given.

AYRES, Q. C., AND SCOATES, D. (841)
LAND DRAINAGE AND RECLAMATION. 419 pp., illus. New York, McGraw-Hill Book Co., Inc. 1928.

Chapter 22, entitled "Control of Soil Washing" is an account of the kinds, causes, and results of soil erosion together with methods of controlling sheet erosion. "Many slopes are too steep to cultivate successfully . . . In such cases, it is best to sod them down for pasture use or reforest them . . ." The two principal types of terraces—the bench and ridge—are considered with variations and instructions for building.

BENHAM, J. F. (842)
INDIANA SOIL CONSERVATION PROGRAM. *Purdue Agr.* 30: 40-41, 48, 50, illus. January 1936.

Discusses the establishment of the Soil Conservation Service and the work it is doing in Indiana. The cooperative activities of the C. C. C. are outlined. Article further describes control methods employed, such as strip cropping, terracing, cover cropping, contour furrowing, and gully control.

BENNETT, H. H. (843)
ATTACKING THE SOIL EROSION PROBLEM ON A NATION-WIDE FRONT. *Agr. Engin.* 16: 293-297, illus. August 1935.

This paper discusses the many phases of the soil conservation movement, including the constructive measures now being adopted by many

States in cooperation with the Federal Government. "There has been a nation-wide network of demonstration projects ranging in size from 25,000 to 16 million acres each. Here the farmers of the county are shown by actual concrete example that it is both practical and possible to halt the inroads of erosion on the fertility, even the very physical substance of their fields . . . There must be a permanent program of erosion control if this country is to maintain permanent prosperity on its agricultural lands."

The need is stressed for the cooperation of farmers and landowners, of businessmen and the press, but especially of the creative cooperation from organizations, such as the American Society of Agricultural Engineers.

BENNETT, H. H.

(844)

BEATING BACK DEVASTATION. *Mag. of Wall St.* 58: 27. April 25, 1936.

Emphasizes the responsibility of the farmer in tilling the soil and at the same time conserving its fertility.

(845)

THE COST OF SOIL EROSION WITH CONTROL SUGGESTIONS. *Ill. Farmers' Inst.* 30 pp., illus. 1934. [Also in *Cong. Rec.* 4857-4860. March 17, 1934.]

This address, delivered at the thirty-ninth annual meeting of the Illinois Farmers' Institute, describes the ravages of soil erosion in various parts of the United States especially Illinois. The different types of erosion are described, and various treatments for each are suggested. The author further discusses the national program of soil conservation and comments on the work conducted on various demonstration areas.

(846)

EROSION: A CAMPAIGN TO CHECK THE WASTE OF OUR PRECIOUS TOPSOIL. *Country Gent.* 101: 10-11, 100-101. May 1931.

"The Federal Land Bank of Houston is making loans on the basis of the top six inches of soil, which . . . represents the farmer's principal capital." The bank's conservation specialists instruct the farmers in terrace building to save Black Belt soil in Texas. The causes of erosion, and the destruction of fertile farmlands in many States are discussed. "Six experiment stations have been installed in six major regions where the problem is serious. Every soil-saving method of promise will be exhaustively tested, such as terraces, various cropping schemes, new crops, strip-cropping, and strip subsoiling . . . gully control will be experimented with, even including 'living dams'—dams built of sacks and living grass roots."

(847)

EROSION CONTROL IMPERATIVE. *Better Farm Equipment and Methods* 4: 33-34. March 1932.

Erosional damage in other countries and in the United States. "Control of the erosion problem is a matter of correct land usage and correct protection."

(848)

HOW YOU CAN HELP. *U. S. Soil Conserv. Serv. SCS-MP-14*, 14 pp. 1936. [Mimeographed.]

An address before the Young Men's Conference "On Behalf of a Continent," September 24, 1935. The author warns of the encroachment of accelerated soil erosion and stresses the need of intensified research to solve the problem. Various control measures are discussed.

(849)

A MAJOR EFFORT AT EROSION CONTROL. *The Land, Today and Tomorrow.* October 1934: 1-4, 20-21, illus. 1934.

This article discusses the work of the Soil Erosion Service, dealing with its general plan of procedure. The author stresses the fact that only through strongly concerted effort will the Service be able to cope with the erosion problem on a national basis.

BENNETT, H. H.

(850)

REPORT OF THE COMMITTEE ON SOIL EROSION. Jour. Amer. Soc. Agron. 26: 1030-1035. December 1934.

The work program of the Soil Erosion Service is described. "The program is characterized by a synthesis of procedure, involving the use of all proven methods of prevention and control in accordance with the most effective practical application of each, with undue emphasis given to none." Tables show different erosion conditions in a reconnaissance erosion survey of the United States, and a 4-year summary of soil and water losses at Guthrie, Okla.

(851)

SOIL CONSERVATION TOMORROW. Ag-Ex News (DuPont) 4: 1, 4, 5, 8, illus. August 1935.

The Soil Conservation Service program, involving more than a half billion acres of land and millions of dollars in investments, is described. Five elements of the program are: (1) Adequate expansion of demonstration projects to cover representative erosion regions; (2) the start and completion of all erosion work needed on land owned or controlled by the United States and on lands draining into Federal reservoirs; (3) application of practical erosion-control measures on large watersheds in the various agricultural regions of the country; (4) adequate research conducted on a scale that will provide fundamental information upon which an effective national erosion-control program must be based; and (5) effort to educate the public in approved methods of control.

(852)

SOIL DETERIORATION BY SHEET EROSION LOWERS FERTILITY OF VAST AREA. U. S. Dept. Agr. Yearbook 1928: 544-547, illus. 1929.

"The direct damage from sheet erosion is incalculably vast. Gullyng and sliding cause much damage to fields and overgrazed and overburned watersheds and ranges. But this spectacular type of land impairment by unrestrained water is small in comparison with the never-ending process of soil wastage by sheets of rain flowing down unprotected slopes."

(853)

WHAT TO DO ABOUT SOIL EROSION ON PIEDMONT FARMS. Tobacco Grower 1: 3-5, illus. July-August 1933.

Part of a series on soil erosion in the South. Discusses the general nature of southern soils and their susceptibility to gullyng and sheet erosion. A national program of soil conservation is described wherein the following are considered: Strip cropping, cover crops, crop rotations, gully control, and the use of steep land.

BOWER, H. J.

(854)

FALL AND WINTER MONTHS BEST TIME TO CHECK SOIL WASHING: HOG WIRE AND POSTS BEST MATERIAL FOR CHECKING WASHES. Kans. Agr. Ext. X-Form 58, 2 pp. November 1918.

On surface soil washing and gullyng in Kansas, and methods and materials to be used for checking.

BOYCE, E.

(855)

WATER SUPPLY AND CONSERVATION. Kans. State Bd. Agr. Bien. Rept. (1934) 29: 98-105, illus. 1935.

"The availability of an adequate supply of water suitable for use can easily be a controlling factor in the agricultural and industrial development of a state." The writer contends that the problem of reducing the pollution of streams is still acute. "Equitable policies with regard to stream pollution must recognize such usage of a stream as will serve the general public best." Storm-water run-off and storage reservoirs are discussed.

BRAND, CHARLES J.

(856)

CONSERVATION LESSONS THE OLD WORLD CAN TEACH US. Fert. Rev. 10: 8-9, illus. November-December 1935.

The author discusses various methods of soil erosion prevention practised in Ireland, England, France, and Germany. "In the field of forestry,

swamp land reclamation, preservation of soil fertility, and erosion prevention, Germany and some other European countries are farther ahead than we."

- BRIGGS, FRANK A. (857)
FARM LAND A PAYING INVESTMENT. Farm and Ranch 53: 1, 5, illus. February 1, 1934.

A description of strip cropping and terracing on the Hooks farms in Hill County, Tex. Discusses the advantages of scientific methods in preventing soil erosion.

- BRODIE, D. A. (858)
BUILDING UP A RUN-DOWN COTTON PLANTATION. U. S. Dept. Agr. Farmers' Bull. 326, 22 pp., illus. 1915.

"This bulletin is an account of the progress made in three years in changing a run-down cotton plantation into a profitable stock and hay farm." Pages 18-19 deal with surface drainage and control of soil washing.

- BROOKS, B. (859)
DRAINAGE TO PREVENT EROSION. Sci. Amer. Sup. 82: 45. July 15, 1916.
[Abstract in Engin. and Contract. 45: 548. 1916.]

Reference is made to the mountain terracing and irrigation system of the Igorots of the Philippine Islands; and to the Mangum terraces on the uplands of North Carolina, South Carolina, and Georgia in the United States. The object of this paper is to suggest soil conservation and flood prevention measures.

- SOIL EROSION. Iowa State Drainage Assoc. Ann. Meeting 11, 111 pp., illus. 1915. (860)

On pages 17-23 the writer advocates such measures as plowing across sloping fields, contour terracing, and earth dams for the control of erosion.

- BROWN, GROVER. (861)
SPREADING WATER IN THE EAST. Soil Conserv. 2: 143, 145, illus. January 1937.

The author contributes some practical information on four types of furrows in Region 1. He treats of uniform slopes, disposal of water from diversion ditches, drainage of spring areas, and the conducting of water from shallow draws.

- BROWN, H. BATES, JR. (862)
SLOPE FACTORS IN SOIL EROSION. Soil Conserv. 2: 240-242, illus. April 1937

The problems of soil erosion, particularly in the Kentucky karst and Tennessee, are discussed in this article. "In an attempt to define erosion hazard in relation to slope, the Soil Conservation Service has divided all slopes into four groups and has made major land-use recommendations accordingly . . . Indications that southward-facing slopes are especially susceptible to erosion have been observed in such widely separated sections of the country as South Carolina, New Jersey, Idaho, and California."

- BROWN, C. B., and McCASH, C. J. (863)
PUTTING EROSION WATER TO WORK. U. S. Ext. Serv. Rev. 6: 107, illus. August 1935.

The authors review the advancement in erosion control in Pima County, Ariz., since 1920 by increased vegetative covering, diversion ditches with tributary branches, check dams, woven-wire barricades, reservoirs, etc.

- BRYAN, KIRK. (864)
DATE OF CHANNEL TRENCHING (ARROYO CUTTING) IN THE ARID SOUTHWEST Science 62: 338-344. October 16, 1925.

This paper discusses the formation of arroyos in northern Arizona and southern Utah, southern Arizona, southern New Mexico, and Sonora, Mexico. Opinions of several authorities are cited, and the conclusion is reached that the greatest need is for further research on the subject.

- BULE, T. S. (865)
SOIL CONSERVATION PROGRAM IN THE SOUTHEASTERN STATES. *Com. Fert.* 52: 22-24, 26-28, 30. May 1936.

This article reviews the past work of the Soil Conservation Service and its predecessor, the Soil Erosion Service. The present program is discussed as applied to the Southeastern States, giving an account of land-use policies, cooperative research, and control methods. The problem in South Carolina is especially considered.

- BURGESS, R. L. (866)
THE NEW FEDERAL FARM PROGRAM. *Calif. Cult.* 83: 246-247, 263. March 28, 1936.

Some high lights of the committee reports of the Salt Lake City Conference, March 9 to 11, called by Secretary Wallace to make suggestions for adapting the new farm program to the needs of the 11 Western States: Crops and Practices on Cropland; Range Conservation Program; Bases and Payment; Producer's Work Sheet; Special Crop Program; Organization and Procedure; Program Planning for 1937; Landlord and Tenant Payments; Education and Development of Soil Conservation.

- BURNS, PEARL ROBINSON. (867)
GRASS AND SURFACE DAMS WILL SAVE PLENTY OF WATER FOR THE DUST BOWL. *Farm and Ranch* 56: 6, 23, illus. August 1, 1937.

The author describes the devastation resulting from wind erosion on areas which never should have been plowed. The reversion of the area to grass and its division into small stock ranches or farms is advocated.

- CALDWELL, NAT. (868)
EROSION CONTROL ON THE FORKED DEER. *Tennessean Mag.*, p. 2, illus. March 7, 1937.

"2,500 farmers in Gibson County have pledged 200,000 acres in soil conservation program for the next five years . . . Called a soil conservation project by its sponsors, the vast 200,000-acre experiment seeks to prove that proper conservation of soil will result in proper conservation of surface and subsurface water, and will to a large extent control sudden rises in creeks and rivers draining the area."

- CALKINS, HUGH G. (869)
EROSION CONTROL IN THE NAVAJO RESERVATION. *The Land, Today and Tomorrow* 2: 19-23, illus. January 1935.

This article describes the work of the Soil Erosion Service at the Navajo project in New Mexico and Arizona. A program has been put into operation requiring a technical staff, a land-use experiment station at Mexican Springs, and a series of demonstration areas ranging from 5,000 to 40,000 acres each.

- CARRIER, LYMAN. (870)
EIGHTEEN FARMERS SAY "WE'LL DO IT OURSELVES." *Soil Conserv.* 2: 165-167, 183, illus. February 1937.

A detailed description of an erosion-control program in the Piedmont of Virginia.

- SAVING VIRGINIA SOILS. U. S. Soil Conserv. Serv. SCS-RB-4, 23 pp., illus. [Blacksburg, Va.] October 1936. (871)

This article presents data on erosion control in Virginia, as a result of studies conducted at the Soil Conservation Service headquarters in Danville, Lynchburg, Chatham, Charlottesville, and Blacksburg, Va. Virginia's 11-point erosion-control program is described under the following headings: (1) Crop Rotation, (2) Contour Tillage, (3) Strip Cropping, (4) Winter Cover Crops, (5) Repairing Galls and Gullies, (6) Terracing and Run-off Control, (7) Permanent Meadows and Pastures, (8) Use of Lime, Manures, and Fertilizers, (9) Reforestation and Woodland Management, (10) Fire Protection of Forest and Fields, and (11) Wildlife Management and Preservation.

- CATHRAILL, S. G. (872)
 DYNAMITE WORKS WITH CCC CAMPS TO DISPOSE OF SULPHUROUS WATER INJURIOUS TO PENNSYLVANIA FARMS. *Ag-Ex News* 5: 8-9. May 1936.
 Describes method of ditch blasting on a Pennsylvania farm for construction of waterway to control flow and spread of sulphurous water from coal mines and at the same time solve an outstanding erosion problem. The method of ditching with dynamite, proposed by workers of Soil Conservation Service, proved efficient in control of all excess run-off.
- CEYLON DEPARTMENT OF AGRICULTURE. (873)
 SOIL EROSION. *Trop. Agr. [Ceylon]* 70: 166-167. March 1928.
 In a memorandum from the Department of Agriculture it is stated that "the first attempts in Ceylon to prevent soil erosion in tea and rubber cultivation consisted in the provision of contour drains." Other measures, among them terracing, silt pits, contour walls of stone, and the use of leguminous cover crops, have been practiced, and a carefully planned experiment has been inaugurated on the experiment station at Peradeniya to test the amount of soil erosion which is taking place and the effects of certain ameliorative measures.
- CHAGNON, RAY. (874)
 THE SAGA OF INDIAN EMERGENCY CONSERVATION WORK ON THE CROW RESERVATION. *Indians at Work* 4 (15): 41-44, illus. March 15, 1937. [Mimeographed.]
- CHAMBERS, T. B. (875)
 COOPERATIVE EFFORTS LAUNCHED TO CONTROL EROSION ALONG HIGHWAYS. *Soil Conserv.* 1: 1-4, 11, illus. April 1936.
 "In recognition of the seriousness of erosion along highways in all parts of the United States, Thomas H. MacDonald, Chief of the Bureau of Public Roads, recently proffered to the Soil Conservation Service the co-operation of his agency in the study of control methods. The suggestion was eagerly welcomed by Mr. Bennett, who at once named a committee to work out cooperative relationships between the two bureaus . . . the ultimate objective should contemplate the adoption of effective erosion control measures on existing highways and inclusion of them in plans for future highways . . ."
- CHAPMAN, H. H. (876)
 INFLUENCE OF OVERGRAZING ON EROSION AND WATERSHEDS. *Civ. Engin* 3: 74-78. February 1933.
 The author contends that too little control of grazing and of other agencies harmful to the natural cover is the cause of the rapid increase in erosion and flood damage in the intermountain region of 154 million acres of public land usable for grazing purposes. "Erosion has destroyed in a generation soil that took 40 centuries to build. This soil is capable of filling storage reservoirs, burying farm land, and reducing the area of both farming and grazing country to such an extent as to definitely diminish the capacity of the country to support population." Intensive scientific study of the causes of erosion to determine means of control is suggested.
- CHAPMAN, I. N. (877)
 VISITORS SEE FARMS RESTORED WHEN EROSION IS CONTROLLED. *Soil Conserv.* 1: 9, 11, illus. December 1935.
 "Erosion control demonstrations in the Shue Creek-Wolsey areas, Beadle County, S. Dak., have recently been the object of a number of organized inspection tours."
- CHARLES, F. E. (878)
 ANCHORING OUR SHIFTING SANDS. *Mich. Farmer* 187: 5, 31, illus. May 8, 1937.
 A brief account of soil conservation work at the Benton Harbor erosion-control project where conservationists are cooperating with fruit farmers toward the adoption of recommended practices of terracing, contour furrowing, and other soil-saving measures on their farms.

CHARLES, TUDOR

(879)

MORRIS COUNTY SHOWS WHAT CAN BE DONE. *Kans. Farmer* 74: 3, 13, illus. July 4, 1936.

Erosion-control methods as practiced by the Soil Conservation Service in Kansas. Describes contouring, terracing, and cropping systems. Buckbrush is especially recommended. Article gives statistics on general erosion conditions in Morris County.

(880)

SOIL SAVING WORK SPREADS OUT. *Kans. Farmer* 74: 1, 13, illus. February 15, 1936.

Tells how the work of the Soil Conservation Service is made available to every farm in Kansas. Specific illustrations are given.

CHIERA, ALBERT.

(881)

NOTES ON EROSION WORK IN FAR-AWAY ITALY. *U. S. Soil Conserv.* 2: 17-18, illus. 1936.

Points out the importance of vegetative cover and suggests means of providing it. Dams for the control of mountain waters, preparing ground for reforestation work, the regulation of streams and rivers, and the conservation of the soil by careful planting are discussed.

CLAPP, S. K.

(882)

THE WATERSHEDS OF NEW YORK. *Amer. Forests and Forest Life* 35: 147-150, illus. March 1929.

Around its reservoirs and aqueducts the city of New York is planting confers to serve a dual purpose—as a soil binder to prevent silt from washing into the water, and to bring about a pleasing landscape scene. Gives a description of the work being done and discusses the experimental work of the nurseries.

CLARK, A. N.

(883)

INDIANS WORK, TOO. *Indians at Work* 3: 35-38. June 1, 1936.

Describes Navajo and Pueblo Indians' interest in soil- and water-conservation work, their cooperation in performing labor, and their pride of achievement in successful projects.

CLEGHORNE, W. S. H.

(884)

SOIL EROSION AND RECLAMATION. *Farming in So. Africa* 6: 379-381, illus. December 1931.

This is the continuation of an article in which the construction of stone and brush weirs as a means of combating soil erosion was discussed. Further means of overcoming the present-day erosion problem are here presented.

(885)

SOIL RECLAMATION: AN EXAMPLE AT WILLOWMORE. *Farming in So. Africa* 6: 277-278, 281, illus. October 1931.

This is an account of satisfactory soil-reclamation work that was inexpensively carried out and "is indicative of what can be attained when good judgment and common-sense methods are brought to bear on a problem of this nature."

(886)

SOME REMARKS ON SOIL EROSION AND RECLAMATION. *So. African Jour. Sci.* 28: 98-102. November 1931.

An account of South African practice in fighting soil erosion and suggestions for improved methods, construction of dams and walls of stone or stone and wire, and the use of plants for fixing loose soil.

CLEMMER, H. J.

(887)

THE SOIL CONSERVATION SERVICE IN SOUTH DAKOTA. *Dakota Zephyr* 2 (2): 2-4. March-April 1936. [Mimeographed.]

Explains working program of the Soil Conservation Service in the field, with special emphasis on the South Dakota demonstration projects involving the Shue Creek and Wolsey areas of Beadle, Clark, and Spink Counties; the Tripp and Gregory County areas; and the C. C. C. camps operating under the direction of the Soil Conservation Service.

- CLEMSON AGRICULTURAL COLLEGE OF SOUTH CAROLINA. (888)
 [DAMAGE BY EROSION AND CONTROL BY TERRACING.] Agr. Ed. 11: 18-47, illus.
 October-November 1934.

"This issue contains some of the latest findings on checking soil erosion, such as terracing, rotation of crops, strip cropping, controlled waterways, reforestation and a wider use of grass on some of the steeper land." The technique of soil-erosion surveys is described, and a procedure for mapping a farm with a sketching board is given.

- [SOIL EROSION.] Agr. Ed. 9, 46 pp., illus. 1932. (889)

This publication is divided into two sections. Section 1 deals with the origin and nature of erosion, terrace construction, and maintenance. Designs and specifications are given for locating and laying out the Mangum or broad-base terrace, and for building a reversible V-drag. Instructions are also given on gully control by means of straw and brush dams. Section 2 discusses soil-building crops and fertilizers.

- COLE, R. O. (890)
 SUCCESS IN SOIL CONSERVATION. Fert. Rev. 11: 12. September-October 1936.

From available material on proper methods of soil and water conservation, the author has listed 19 points including legumes, rotations, lime and fertilizers, strip cropping, terracing, and gully control as being the most successful.

- COLLIER, CHARLES W. (891)
 SOIL CONSERVATION IN THE NAVAJO COUNTRY. Soil Conserv. 1: 1-4, illus.
 November 1935.

The author stresses the evils of overgrazing in the Navajo country and the importance of more careful land use to build up and maintain proper soil conditions.

- CONDRA, G. E. (892)
 CONSERVATION OF LAND AND WATER RESOURCES OF NEBRASKA. Nebr. Univ.
 Conserv. Dept. Bull. 14, 46 pp., illus. [Lincoln.] December 1936.

Topics discussed are: Water resources; land problem areas including badlands, rough stony lands, tablelands, eroded drift and loess hills; irrigation reclamation; agricultural forestry; conservation and wildlife habitats; and water conservation.

Literature references, pages 41-46.

- COOK, R. L. (893)
 LIME AND FERTILIZERS CONSERVE SOILS. Mich. Farmer 187: 5, 15, illus. March
 27, 1937.

"Since it is possible under the provisions of the 1937 Soil Conservation Program to qualify for benefit payments to the extent of approximately one-half the cost of liming materials, no one is justified in seeding alfalfa and clover on soils where the acidity is high enough to jeopardize the success of the crop . . . Any farmer who is neglecting to make full use of lime and commercial fertilizer cannot hope to fully capitalize on the shift from depleting to soil-building crops."

- COPPLE, R. F. (894)
 PHOTOGRAPHY AND SOIL EROSION. The Land, Today and Tomorrow 2: 27-28,
 illus. February 1935.

The writer stresses the importance of photographs in soil-erosion work and gives a few simple instructions toward their improvement.

- CORTHELL, E. L. (895)
 THE WAR AGAINST THE WAVES. A REVIEW OF FORTY-FOUR YEARS' EXPERIENCE IN
 THE PROTECTION OF SANDY SHORES FROM THE ENDLESS ATTACK OF THE SEA.
 Engin. Rec. 69: 408-412, illus. April 11, 1914.

A description of methods used in the Netherlands and in England to control coast erosion. Gives designs and specifications of various types of dikes, spur jetties, and low groins.

CHAVEN, AVERY O.

(896)

SOIL EXHAUSTION AS A FACTOR IN THE AGRICULTURAL HISTORY OF VIRGINIA AND MARYLAND, 1606-1860. Ill. Univ. Studies in Social Sci. 13, No. 1, 179 pp. March 1925.

"It is not the purpose of this monograph to attempt an exact measurement of the degree of soil depletion that occurred in Virginia and Maryland in the period under consideration, nor will any effort be made to measure the full effects of soil depletion upon the social order. The term 'soil exhaustion' will be applied as the men of the period applied it and no effort will be made at exactness. From such a study it is hoped that the importance of this factor in the history of the region may be pointed out, and that a basis will be established from which the more important questions as to why the men of this section employed destructive methods in their agriculture, may be answered. A solution of this latter problem has been sought in a rather detailed study of agricultural practices . . ."

CREEL, GEORGE.

(897)

SOIL SAVERS. Collier's 98: 12-13, 49. August 29, 1936.

Tells how the Soil Conservation Service was born and something about its work which "links up with almost every known problem."

CULPIN, CLAUDE.

(898)

STUDIES ON THE RELATION BETWEEN CULTIVATION IMPLEMENTS, SOIL STRUCTURE, AND THE CROP. 1. SOME PRELIMINARY OBSERVATIONS ON THE MEASUREMENT OF SOIL STRUCTURE, WITH A DESCRIPTION OF AN INSTRUMENT FOR THE MEASUREMENT OF SOIL RESISTANCE. Jour. Agr. Sci. [England] 26: 22-35, illus. January 1936.

"The application of this apparatus and of certain other methods for the study of soil structure to experiments on the 'gyrotiller' is briefly described." The gyrotiller is a rotary cultivator with a Diesel engine.

(899)

STUDIES ON THE RELATION BETWEEN CULTIVATION IMPLEMENTS, SOIL STRUCTURE, AND THE CROP. II. THE EFFECTS OF THE FOWLER "GYROTILLER" ON THE SOIL. Jour. Agr. Sci. [England] 26: 45-58, illus. January 1936.

"A general account is given of four experiments in which the action on the soil of the Fowler 'gyrotiller' has been compared with that of the traditional cultivation implements. The gyrotiller has produced well-marked changes in the soil on both heavy and light land. These changes have been demonstrated and recorded by tests of the compactness, the resistance, the degree of comminution and the permeability of the soil . . ."

CURTIS, N. J.

(900)

HEADLANDS. U. S. Soil Conserv. Serv. News 2 (2): 9. March 1936. [Mimeographed.]

The author describes various treatments of turn rows at each end of a field, as well as simple measures to prevent accumulation of water, and gullyng.

DANIEL, H. A.

(901)

CALCULATED NET INCOME RESULTING FROM LEVEL TERRACES ON RICHFIELD SILT LOAM SOIL AND SUGGESTED LINES OF DEFENSE AGAINST WIND EROSION. Okla. Panhandle Agr. Expt. Sta. Bull. 58, 14 pp., illus. 1935.

Costs of terrace building and contour cultivation are considered. Practical methods of controlling soil blowing are recommended, such as cropping and tillage systems, utilization of erosion-resisting residues, emergency cover crops, and planting trees for windbreaks.

DAVIS, ARNOLD.

(902)

BRINGING EROSION CONTROL TO SOME HIGHWAYS. Soil Conserv. 3: 48-50, illus. August 1937.

"Each highway erosion-control project embraces (1) changes and treatment of the road section, (2) type of cover to be established, and (3) a detailed plan of special control measures contemplated." A short description of methods used is given.

DAVIS, ARNOLD

(903)

EROSION CONTROL ALONG HIGHWAYS. Agr. Engin. 18: 169-170, illus. April 1937.

"The Soil Conservation Service has offered to cooperate with state highway departments in establishing a number of highway erosion-control areas in Region 4. [Louisiana, Arkansas, and Texas.] The U. S. D. A. Bureau of Public Roads has also displayed an interest in such areas, and will approve the expenditure of funds through the regular federal aid program in order that this work may get under way." The areas are described as cooperative projects between the Soil Conservation Service and the different State highway departments. A summary of the work is given.

DAVIS, R. H.

(904)

SECOND ANNUAL REPORT COON CREEK DEMONSTRATION AREA, LA CROSSE, WIS.

U. S. Soil Conserv. Serv. SCS-AR-2, 24 pp., illus. May 1, 1936. [Mimeographed.]

This report summarizes the results of studies conducted at Coon Creek, Wis., and discusses the research work of the project under the following headings: Soil Types, Erosion-Control Plans, Terracing, Check Dams, Forestry, and Wildlife Conservation.

DENHAM TILL, F.

(905)

SOME PRACTICAL NOTES ON THE PREVENTION OF SOIL EROSION UPON ESTATES.

Trop. Agr. [Ceylon] 66: 252-256. April-May 1926.

"The outstanding features of these clearings are that the earth has been shifted on a carefully thought-out plan, and all terraces are given a definite reverse slope against the hill, instead of being level."

DETWILER, S. B.

(906)

FIFTY YEARS' EXPERIENCE GIVES JAPAN SIMPLE, EFFECTIVE PROGRAM. Soil Conserv. 3: 9-10, illus. July 1937.

In Japan "regulated tillage, intelligent farm management, reclamation practices, and care for the steeper lands have yielded quick and convincing results, and this fact undoubtedly lends encouragement to the newer program in the United States." Species of trees are listed which have proved effective to control erosion in Japan.

DREIER, JOHN.

(907)

THE COORDINATED PROGRAM FOR THE SOUTHERN HIGH PLAINS. U. S. Resettlement Admin. Land Policy Cir. 3: 15-18. June 1937.

Enumerates the important factors involved in a coordinated program for protective land use in the dust-storm area. Development of soil conservation districts in each State is indicated to be of utmost importance.

DRIPS, W. E.

(908)

FARMS THAT WASH AWAY. Wallaces' Farmer and Iowa Homestead 58: 9, illus. July 22, 1933.

"Soil control to prevent washing seems to be bound up in crops," is the opinion of the author, based on results of experiments made at Bethany, Mo. experiment station. A deep gully has been filled and made productive, terracing has proved effective to slow down water, and rotational crops have held and built up the soil again.

DUCE, J. T.

THE EFFECT OF CATTLE ON THE EROSION OF CANYON BOTTOMS. Science 47: 450-452. 1918.

"From a study of the steep-walled arroyos of southern Colorado the author concludes that their development has been contemporaneous with the development of ranching, and he believes they are due to the wearing of trails and the destruction of vegetation by cattle."—Expt. Sta. Rec. 39: 512. 1918.

DULEY, F. L.

(910)

EXPERIMENTAL WORK IN KANSAS. Okla. Agr. Expt. Sta. Cir. 79: 19-21. 1931.

A paper read at the second Southwest Soil and Water Conservation Conference. Discusses the soil erosion problem in Kansas and describes experimental work at the Hays station.

- DU-PLAT-TAYLOR, F. M. (911)
THE RECLAMATION OF LAND FROM THE SEA. 153 pp. London, Constable & Co., Ltd. 1931.
"There are many localities where reclamation can be effected with advantage for industrial and other purposes not connected with agriculture. Such works have been frequently carried out, and some of these have been described in this book." Objects and methods of reclamation, reclamation by enclosure and by filling, with tabular data, are considered. Chapter IV is devoted to the reclamation of the Zuider Zee in the Netherlands.
- EAST, L. P. (912)
SOIL EROSION AND SOME OF ITS CONTROLS. *Purdue Agr.* 22: 9. October 1927.
In this article on erosion control in North Carolina, the author presents data on three major control methods: (1) Dikes or flat ditches; (2) hill-side ditches; and (3) terraces. Other means of reducing erosion such as cover crops and tillage are considered briefly.
- EKBLAW, G. E. (913)
LANDSLIDES NEAR PEORIA. *Ill. State Acad. Sci. Trans.* 24: 350-353, illus. December 1931.
"The walls of the valley of Illinois River constitute an admirable locale for landslides, and in the vicinity of Peoria, where the Pennsylvanian system of rocks crop out, and is overlain by glacial drift, landslides are numerous." The only real cure for these slides is proper drainage.
- EWALD, R. F. (914)
PREVENTING EROSION BELOW OVERFLOW DAMS. *Civ. Engin.* 1: 527-531, illus. March 1931.
"Flood flows over high dams contain enormous energy that must be expended and absorbed in friction on the toe of the dam, in erosion of the river bed below, or in a water cushion. If this energy can be absorbed in the work of creating the hydraulic jump without assistance from river channel friction, there is no likelihood of failure due to erosion." The author gives the results obtained by his studies and draws a preliminary conclusion.
- F., W. C. (915)
LOST! AN EIGHTY THOUSAND ACRE FARM! *Wash. Farmer* 69: 3-4, illus. November 15, 1934.
It is stated that there are at least five major objectives in the Nationwide effort to control erosion: (1) Prevention of moisture loss by water run-off; (2) control of soil-washing; (3) control of flood water; (4) restoration of the water table; and (5) control of soil drifting. Work at the Pacific Northwest Erosion Experiment Farm, Pullman, Wash., is described. Data on erosion in the Palouse section are presented in tabular form.
- FELSINGER, E. O. (916)
MEMORANDUM ON A SYSTEM OF DRAINAGE CALCULATED TO CONTROL THE FLOW OF WATER ON UP-COUNTRY ESTATES, WITH A VIEW TO REDUCING SOIL EROSION TO A MINIMUM. *Trop. Agr. [Ceylon]* 71: 211-214, illus. October 1928.
A plan to reduce soil erosion, devised and carried out with considerable advantage on the writer's estates at Primrose Hill, Kandy, and Fruit Hill, Hatton, in Ceylon is described.
- FENNEMAN, N. M. (917)
SOME FEATURES OF EROSION BY UNCONCENTRATED WASH. *Jour. Geol.* 16: 746-754. November-December 1908.
This paper discusses the nature and formation of gullies, and some of the topographic effects of erosion without valleys. "The area in question is the St. Louis quadrangle and adjacent territory."
- FENTON, F. C. (918)
THE VARIATIONS IN KANSAS SOIL MOISTURE. *Northwest. Miller and Amer. Baker* 13: 58, illus. April 1, 1936.
The writer discusses briefly the weather and rainfall in Kansas. A chart is included showing the rainfall history at Manhattan, Kans., for 75 years.

- FERGUSON, A. M. (919)
ANCIENT IRRIGATION METHODS ARE YIELDING PLACE TO NEW. *New Agr.* 19: 9, illus. December 1936.

"Overhead irrigation applies water in form of rain with the advantage over nature of perfect control as to time and duration of application—rainfall when and where needed, and in just the right amount. There is no waste of water—distribution is even and controlled and no grading or leveling with consequent movement of top soil is necessary. Erosion is not a problem with this system, and soil fertility is maintained at its maximum."

- FICK, J. C. (920)
EROSION OF CULTIVATED LANDS. *Farming in So. Africa* 8: 173-175. May 1933.

The author suggests practical methods for combating soil washing and wind erosion. He describes the use of terraces, embankments, and contour walls and recommends various cropping systems. A few species of trees for windbreaks are listed, and data on permanent vegetation given.

- FISHER, F. A. (921)
SOIL CONSERVATION SERVICE PROGRAM IN ILLINOIS. *Rock Prod.* 39: 48-49. August 1936.

"This paper describes briefly and accurately just what the Soil Conservation Service is doing in a 'typical prairie state,' with figures on the limestone requirements. Producers of agricultural liming materials everywhere should get behind this movement to conserve our most precious heritage—our arable soils."

- FITZPATRICK, J. L. (922)
CONSERVING FORESTS AND REBUILDING MEN. THE C. C. C. AS PART OF THE NEW DEAL. *Scholastic* 24: 23-25, illus. March 17, 1934.

A chief feature of President Roosevelt's recovery program is the employment of men in conservation projects of one kind or another. The Civilian Conservation Corps has kept 300,000 young men enrolled for two 6-month periods and is to be continued for another year. A description of life in these camps and the reafforestation work and fire fighting by the Corps is given. A short summary of the Director's report is presented. The work of the Army in training the Civilian Conservation Corps boys is also mentioned.

- FLEMING, B. P. (923)
NATION-WIDE VIEW OF ESSENTIAL SOIL EROSION CONTROL MEASURES. *Agr. Engin.* 15: 267-272, illus. August 1934.

A retrospective account of accelerated soil erosion precedes a description of the policy of the Soil Erosion Service and its program. The author states that cooperation with farmers is being sought, practical programs are under way, and the greatest care is being exercised in making recommendations.

- FLETCHER, S. W. (924)
LOSS OF SOIL BY EROSION. *Country Life* 9: 456. February 1906.

"Unchecked erosion has ruined many farms and seriously hurt many others . . . A very important problem for the farm owner to consider is how to check erosion cheaply and effectively." Various measures are discussed with emphasis on the need for vegetative cover.

- FORREST, T. C., JR. (925)
ORGANIZING FOR WATERSHED DEVELOPMENT. *Civ. Engin.* 7: 490-493, illus. July 1937.

Outlines the objectives of the recently developed watershed district plan in Texas. The work of the Civilian Conservation Corp and the Soil Conservation Service in erosion control is discussed.

- FORSLING, C. L. (926)
THE SOIL PROTECTION PROBLEM. *Jour. Forestry* 26: 994-997. December 1928.

Watershed protection is considered under four headings with special emphasis on the checking of erosion to prevent depletion of the soil itself. Chemical analysis of the Utah National Forest soil and work at the

Missouri State Agricultural Experiment Station are discussed. "Protection of the soil will have to be accomplished largely by good forestry, the prevention of fire, and the application of proper grazing practices."

- FRENCH, A. L. (927)
STOP SOIL WASHING. *Prog. Farmer* (Eastern Ed.) 34: 1204-1205. July 26, 1919.

The author, a practical farmer, holds that soil cannot be effectively enriched until soil washing is stopped; terracing should be supplemented with soil-binding sods; washing of land is stopped by under drainage, deep plowing, and vegetation.

- FULLER, GUY C. (928)
HARVESTING NATIVE GRASS SEED. *Agr. Engin.* 17: 195-197, illus. May 1936.

The author describes the Minahan power stripper for harvesting grass seed and enumerates its advantages. He also describes the Hays vacuum machine for harvesting buffalo grass seed.

- FULLER, MYRON L. (929)
SOME UNUSUAL EROSION FEATURES IN THE LOESS OF CHINA. *Geogr. Rev.* 12: 570-584, illus. October 1922.

- FUNCHESS, M. J. (930)
TERRACE: THEN PLANT LEGUMES. *Prog. Farmer* (Ga. Ala. Ed.) 49: 5, 10. August 1, 1934.

Sets forth some vital facts about crops in the South. Low yields show that poor lands must be built up. Terracing of land subject to washing, and the subsequent planting of legumes as soil-building crops are strongly urged.

- GEIB, H. V., AND HILL, H. O. (931)
SOIL EROSION AND MOISTURE CONSERVATION STUDIES. *Tex. Agr. Expt. Sta. Ann.* Rept. 44: 133-134. 1931.

The authors give measurements of amounts of water and soil losses on control plots and discuss strip cropping with sorghum or oats as erosion resistants. Terracing methods for erosion prevention are included.

- GILKERSON, R. H. (932)
THE BIG THING IN KANSAS FARMING. *Kans. Farmer* 72: 3, 19, illus. September 15, 1934.

"Terracing and contour farming take out the uphill pull in field work. They let you farm hills on the level. You farm across the slopes. They check soil washing. They build up fertility . . ." The author adds: "The idea is to make terracing, contour farming, seeding down steep slopes, gully control and a cropping system stop the tremendous loss of moisture and soil fertility that has been going on . . ."

- GORRIE, R. M. (933)
NOTE ON SOIL EROSION IN THE PUNJAB. *Indian Forester* 63: 67-75. March 1937.

Extracts from reports on erosion conditions from 1855 to 1936 are discussed. "Forest conservation has to some extent checked erosion, but even with the best intentions the earlier forest settlements have failed to forestall the progressive deterioration which has inevitably taken place in face of persistent heavy grazing." Among the measures advocated for erosion control are development of tree fodder supply and green fodder crops and silage; intensive improvement of natural grasslands with "gully plugging;" terracing and leveling of fields; stream training to reclaim cultivable lands along torrent channels.

- GOSSETT, M. H. (934)
SOIL AND WATER CONSERVATION WORK IN TEXAS. *Manfrs. Rec.* 98: 44-45, illus. September 18, 1930.

A discussion of what has been accomplished in soil and water conservation work and its significance to the agriculture of Texas. "In three years more than three times as much land has been protected from erosion and water losses as during the previous 20 years." It is stated that Texas then had one-third of all the terraced land in the United States.

- GRANGER, C. W. (1935)
THE OCC AND SOIL CONSERVATION IN THE SOUTHWEST. *Soil Conserv.* 2: 161-164, 173, illus. February 1937.
C. C. C. work in the Rio Grande district is described, with special reference to the Elephant Butte Dam and Reservoir and problems connected with them. Ten camps were established "and enrollees . . . under the supervision of technical men, have accomplished voluminous work which already has proved effective for soil and water conservation and revegetation."
- GULLEY, F. A. (1936)
CONTROLLING THE ACTION OF WATER ON THE SOIL. *Soc. Prom. Agr. Sci. Proc.* at Phila., Pa., September 1884, (Ann. Meet 5) v. 2, pp. 35-38. 1885.
The destructive effect of uncontrolled water on the lower Mississippi and from the Ohio River to the Gulf of Mexico is stressed. "I soon became convinced that a successful system of ditching, that would control the action of the surface water and remove the excess of soil water, was of more importance than fertilizing to bring the land up to profitable production of crops." Methods and specific results from ditching are discussed.
- GUM, E. P. (1937)
THE FARMER'S BANKER. *Banking* 30: 27. July 1937.
"In Oklahoma our bankers, working through the agricultural committee of the Oklahoma Bankers Association, are cooperating with Government and state agencies and the American Bankers' Association to help save our soil . . . We have secured the passage of a bill through our state legislature appropriating six power terracing machines for each county. Where this fails to take care of the demand of farmers who cannot afford their own terracing equipment it will be the purpose of our bankers to furnish a few homemade machines which can be constructed at a reasonable price. Through this method we may be able to furnish an outlet for the latent power ready to start the work of terracing thousands of our farms."
- HAFFERT, W. A. (1938)
SOIL CONSERVATION SURVIVES TEST. *Farm and Garden* 7: 34. October 1936.
The Monmouth County, N. J., demonstration area has proved that all erosion-control measures were successful.
- HAINES, W. B. (1939)
SOME CONSIDERATIONS ON SILT-PITTING. *Rubber Research Inst., Malaya, Quart. Jour.* 1: 20-28. January 1929.
The author explains that the term "silt-pit" in soil conservation work is not entirely well chosen. "It is apt to carry with it the idea of silt-collecting pits rather than that of silt-prevention pits. Silt being the product of soil erosion it is plain that an ideal system for preventing erosion will put silt out of the question." Among the main features summarized are the following: "In the first place a low-growing ground cover must be looked upon as the main line of defence in regard to soil erosion. It protects the soil from direct impact of the rain as nothing else can do; increases the absorptive capacity of the soil while at the same time binding it together; and maintains healthy conditions in the soil surface."
- HANSON, A. C. (1940)
AS FARMERS STUDY SOIL PROGRAM. *Wallaces' Farmer* 61: 324. April 25, 1936.
Brief review of soil conservation practices employed by northwestern Iowa farmers.
- HAVILAND, P. H. (1941)
FURTHER NOTES ON SOIL EROSION. *Rhodesia Agr. Jour.* 22: 831-839, illus. November 1925.
Discusses the nature of soil erosion and presents important data on control by means of storm drains and terraces.
- (1942)
PREVENTIVE MEASURES AGAINST SOIL EROSION IN SOUTHERN RHODESIA. *So. African Jour. Sci.* 24: 110-116. December 1927.
"In this paper it is proposed to give a short account of the actual practical measures adopted in Southern Rhodesia to prevent that insidious evil—

soil erosion." Three forms of erosion are considered: General veld erosion; erosion of vleis; sheet washing or the erosion of cultivated lands. Examples are given of typical cases which have been dealt with in the past.

- HAVILAND, P. H. (943)
SOIL EROSION. Rhodesia Agr. Jour. 25: 1217-1224. November 1928, 26: 325-338, illus. April 1929.

The first article of a series on erosion and erosion control in Rhodesia, deals with the various types of erosion and discusses generally methods of control.

The second article deals with the laying out and construction of contour ridges. Plans and specifications are given and costs of construction are itemized. Gully control is also briefly described.

- HENDRICKSON, B. H. (944)
SOIL EROSION INVESTIGATIONS. Tex. Agr. Expt. Sta. Rept. 46: 138-141. 1933.

This article discusses the progress of a cooperative study conducted by the United States Bureaus of Agricultural Engineering and Chemistry and Soils at Experiment Substation No. 2, Tyler, Tex.

- HENRY, JEROME J. (945)
SAVING VIRGINIA SOILS. South. Planter 98: 14, illus. April 1937.

This article briefly discusses the 11-point program for erosion control by the Soil Conservation Service in cooperation with the Extension Service in Virginia.

- HENRY, S. T. (946)
TENNESSEE VALLEY ACTIVITIES TODAY. Engin. News-Rec. 116: 238-239. Feb. 13, 1936.

"Only a start has yet been made in the improved farming program; years will be needed to show full results. But thousands of farms already have seen that cover-crop farming will make money. Given a decade or two, the agriculture of the valley will be changed completely as the outcome of this demonstration program. Such a change will mean that soil erosion will be largely stopped, stream silting reduced, and agriculture placed on a permanent basis . . . Regional development work ranging from flood control and navigation improvement to agricultural and forest development is TVA's fundamental problem, largely overlooked because of power controversies."

- HENRY, T. R. (947)
WORLD WATCHES EXPERIMENT WITH NAVAJOS. Indians at Work 4: 32-34. September 15, 1936.

The Soil Conservation Service work at Mexican Springs is described. "It is notable that the methods now being used to repair the damage are copies of farming practices followed by these Indians from time immemorial. The primary problem at Mexican Springs is the restoration of the land."

- HILGARD, E. W. (948)
SOILS. 593 pp., illus. New York, Macmillan Co. 1906.

On pp. 216-220 some phases of soil erosion are considered, under the following headings: Washing Away and Gullying in the Cotton States; Injury in the Arid Regions, and Prevention of Injury to Cultivated Lands from Excessive Run-off.

- HITCHCOCK, E. (949)
EROSION OF THE EARTH'S SURFACE ESPECIALLY BY RIVERS. Smithsn. Contrib. to Knowledge 9: 81-127. 1855.

The modes and extent of erosion by rivers are considered on page 91. The making of rivers is a process of both erosion and filling up, the process of excavation, however, exceeding that of deposition. "Without attempting to determine the precise amount of erosion by rivers, I wish to state distinctly that I do not impute to this agency the whole, or even the larger part, of the formation of the valleys through which rivers now run . . ." The writer states that the Delta of the Mississippi, at its present rate of increase, must have required over 14,000 years to accumulate.

HOFFMAN, M. H.

(950)

METHODS OF CHECKING EROSION OF FARM LANDS IN IOWA. Engin. News-Rec. 87: 28. July 7, 1921.

The author claims that brush dams and tile drains reduce destructive flow after rains and cause gullies to fill with sediment.

HOFFMAN, M. H., AND TURNER, A. W.

(951)

THE PREVENTION OF SOIL EROSION, TREATING HILLSIDE DITCHES—I; CHECKING OVERFALLS—II. Iowa Agr. Col. Ext. Bulls. 73 and 74, illus. 1920.

"This report is in two parts and deals with practice in checking and preventing soil erosion in Iowa. Part I, deals with the treatment of hillside ditches. It is stated that one of the best methods of preventing hillside wash in Iowa is the practice of contour farming. The practice of leaving permanent strips of sod in hillside valleys is also strongly recommended . . . Part II, deals with the checking of overfall. It is stated that practically all ditches in Iowa are caused by overfalls working back. A successful method of preventing the overfall from working back is to ease the water from the higher to the lower level by putting in an obstruction of straw and brush staked down."—Expt. Sta. Rec. 43: 420. 1920.

— AND TURNER, A. W.

(952)

THE PREVENTION OF SOIL EROSION—III: FILLING THE LARGE DITCH. Iowa Agr. Col. Ext. Bull. 77, 4 pp., illus. 1920.

This bulletin deals with the filling of large ditches by means of straw, brush, and wire-fence obstructions.

— AND TURNER, A. W.

(953)

THE PREVENTION OF SOIL EROSION—IV: EARTH OR ADAMS DAM. Iowa Agr. Col. Ext. Bull. 78, 4 pp., illus. 1920.

"One of the most satisfactory methods of retaining the dirt that is washing down a ditch where the slope is not very steep is by the use of an earth dam with a culvert having a raised inlet." The method of construction is described and illustrated.

HOLLAND, T. H.

(954)

PROPOSED SOIL EROSION EXPERIMENT AT THE EXPERIMENT STATION, PERADENIYA. Trop. Agr. [Ceylon] 65: 89-90, illus. August 1925.

"There are two areas available . . . The proposal is to duplicate two methods of treatment in one area and another two methods in the other area." These treatments are described and illustrated by a diagram.

SOIL EROSION AND COVER CROPS. Trop. Agr. [Ceylon] 66: 248-253. April-May 1926.

Special measures for preventing erosion are suggested, among which are contour planting, the use of cover plants, earth terracing, and stone terracing.

HOLMAN, R. L.

(956)

TVA SOIL PROJECT. Dixie Farm and Poultry Jour. 13: 10-11. March 1934.

"Few, if any, projects undertaken by the Soil Erosion Service promises to be of greater importance to as many tillers of the soil in such a large area as the one at present being organized in the Great Tennessee Valley." Five demonstration stations have been established for the purpose of carrying on experimental work in a big way. Projects to be established are discussed.

HOLMES, J. S.

(957)

PREVENTING EROSION IN PIEDMONT DRAINAGE DISTRICTS. N. C. Geol. and Econ. Survey Press Bull. 133, 5 pp. October 7, 1914.

"The gradual clearing of the forest from even the steeper slopes of the uplands and the continuous cultivation of these fields without addition of any vegetable matter to the soil has caused extensive and ever increasing erosion . . . The beneficial results of drainage have been very marked." The North Carolina drainage law is quoted as providing for the maintenance of the ditches or canals when they become obstructed or begin to be filled up with sand. "Excessive erosion of the upland can be prevented and must be prevented before the creek bottoms attain to permanent usefulness."

A concrete example of a policy to be followed is that of the Buffalo Creek Drainage District, which is outlined. Terracing, permanent pastures, re-afforestation, and proper management of the farm wood lot are advocated for the prevention of erosion on Piedmont lands.

HOLMES, J. S. (958)

SOME NOTES ON THE OCCURRENCE OF LANDSLIDES. *Elisha Mitchell Sci. Soc. Jour.* 33 (3): 100-105. November 1917.

Landslides in western North Carolina in July 1916 are discussed from the standpoint of causes, topography, nature of rock and soil, and forest cover. "The soil cover seems to have made little or no difference in inducing slides . . ." After quoting Marbut of the United States Bureau of Soils, the author says: "From this it would seem that the physical features which enable the forests to retard the run-off, and thus tend to control floods during periods of normal precipitation, might even increase the liability to landslides during periods of such excessive rainfall . . ."

HOOVER, M. M. (959)

NATURAL TERRACES FOR THE WEST VIRGINIA HILLS. *The Land, Today and Tomorrow* 2: 13-14, illus. February 1935.

Description of erosion control work at project No. 13 in central West Virginia.

HOPE, G. D. (960)

NOTE ON SOIL DENUDATION BY RAINFALL AND DRAINAGE: CONSERVATION OF SOIL MOISTURE. *Agr. Jour. India.* 11: 134-141. April 1916.

"Suggestions for the prevention of erosion of northeast Indian tea soils are given, special reference being made to terracing and drainage as practiced on Java tea soils."

HOWARD, IVY M. (961)

ANCHORING FARM LANDS. *Successful Farming* 33: 12-13, 69-70. March 1935.

Midwest farmers are discovering that erosion control and strip farming are not only saving their land but are also enabling them, through the droughts, to grow better than normal crops, and keep the springs flowing. Describes the work of various Oklahoma farmers.

(962)

"CROOKED ROW" FARMING FOUND BEST. *South. Agr.* 67: 31. April 1937.

Note on erosion control by the installation of hand-made gully checks and dirt fills, supplemented by sowing the low places with sweetclover and allowing crabgrass to grow.

(963)

HOLDING ON TO THE SOIL. *South. Agr.* 65: 6, 30, illus. February 1935.

This article describes the work and program of the erosion control project at Stillwater Creek, Okla. Special consideration is given to methods of gully control and terracing.

HUDSPETH, T. J. (964)

EROSION—AN ARIZONA VIEW. *Natl. Wool Grower* 22: 7. December 1932.

In a letter the writer protests against any future talks about erosion in Arizona being caused by grazing. "This erosion you are fond of as a subject has been going on for the last eighty million years, or more . . . Had it not been for this erosion you would have had no fine Salt River land to worry about watering, or any other land rich enough to produce crops . . . Erosion made the great Imperial Valley which has fed millions of people and added millions of dollars to the Nation . . . Sheep and goats restrict erosion, something many people do not know." The reasons for this last statement are given. "In view of present-day conditions for the stockmen in general, I kindly and with all respect ask you to change your subject."

HUFF, A. N. (965)

RESEARCH. *U. S. Soil Conserv. Serv., Soil Conserv. News* 2: 12. March 1936.

Explanation of work to be conducted on the research project in the Coshocton River watershed.

HUTCHESON, J. R.

(966)

ANNUAL REPORT OF EXTENSION WORK IN AGRICULTURE AND HOME ECONOMICS IN VIRGINIA. Va. Agr. Col. Ext. Bull. 141, 56 pp., illus. 1936.

Soil conservation program, pages 8-12: "Soil conservation has been a definite part of the extension program since the first county agent was appointed, and as a result of the use of terraces, winter cover crops, and improved pastures, thousands of acres have been improved through proper crop rotation and the planting of legumes. During the last two years the soil conservation program in this state has received great impetus through the enactment of federal legislation establishing the Tennessee Valley Authority, the Resettlement Administration, and the Soil Conservation Service."

HUTCHINSON, C. B.

(967)

PARTNERS IN AGRICULTURAL PROGRESS. 230 pp., illus. Berkeley, Calif. 1936.

Chapter 1, The Source of Our Wealth, contains the following paragraph headings of interest: What soil surveys in California disclose; the significance of soil conservation; erosion prevention; forests and water conservation; permeability of soils; effect of puddling on permeability; problems of the range; building up our soils with vetches; and soil deficiencies. Results from 10 erosion-prevention demonstration areas are reviewed.

HUTSON, J. B.

(968)

THE AGRICULTURAL CONSERVATION PROGRAM AND VEGETABLES. Market Growers Jour. 60: 20-23. January 1, 1937.

"The Agricultural Conservation Program undertakes to help save it [the land] by encouraging methods of farming that do most to prevent depletion and erosion of the soil. Proper rotation, more land in grass and legumes, trees and sod on steep slopes, and adequate fertilization are among the well-known methods." Other proposals in the program are also listed.

ILLINOIS AGRICULTURAL EXPERIMENT STATION.

(969)

WORK OUT WAYS FOR BETTER PREVENTION OF SOIL WASHING. Ill. Agr. Expt. Sta. Rept. 1930: 209-210, illus. 1930.

Gives estimates on the acreage in Illinois subject to erosion and discusses terrace control.

IMPERIAL BUREAU OF SOIL SCIENCE.

(970)

SOIL EROSION. Imp. Bur. Soil Sci. (Rothamsted Expt. Sta.) Tech. Commun. 16, 10 pp. 1931.

Administrative action relative to soil erosion in the Empire is set forth. Experiments in Nyasaland and Uganda, Africa, in contour plowing and strip cropping, and terracing in the United States and its success are described and discussed. A laboratory study of the factors relating to erodibility is described, and determinations are quoted from United States Department of Agriculture Technical Bulletin 178.

INDIANA AGRICULTURAL EXPERIMENT STATION.

(971)

SOIL EROSION. Ind. Agr. Expt. Sta. Rept. 1926: 17. 1926.

States that evidence of erosion appears where there is a steeper grade than 0.6 of a foot per 100 feet on the Paoli soil erosion experimental field, terraced in 1924.

IOWA AGRICULTURAL EXPERIMENT STATION.

(972)

REPORT ON AGRICULTURAL RESEARCH FOR YEAR ENDING JUNE 30, 1936. Iowa Agr. Expt. Sta. Rept. pt. I, 220 pp. [1936.]

This report discusses the work of the State Soil Conservation Advisory Committee, pages 19-20; Coordination of Work at Erosion Stations, page 27; Cooperation with Missouri in Economic Implications of Soil Erosion Stations, page 27; Soil Erosion Experimental Nursery, page 38; Page County Soil Erosion Farm, page 39; Soil Erosion Investigations in Iowa, page 40; Erosion Control Work in Iowa, page 40; The Establishment of an Erosion Control Nursery, page 41.

IOWA AGRICULTURAL EXTENSION SERVICE.

(973)

SAVE IOWA SOILS. Iowa State Agr. Col. Ext. Paper, 8 pp., illus. January 1930.

"Hundreds of Iowa farmers have stopped erosion on their farms the last few years though on the whole erosion is going on at a tremendous

rate." Planting black locust with heavy vegetative cover for gullies; dams of earth, brush, wire, and concrete, terracing, and systematic rotations are among the measures recommended for soil conservation.

- IOWA STATE DRAINAGE, WATERWAYS, AND CONSERVATION COMMISSION. (1974)
THE CONSERVATION OF (IOWA) SOILS. Iowa State Drain. Waterways and Conserv. Comn. Rept. 210 pp., illus. 1909-10.

The chapter on soil conservation, pages 167-187, is devoted to measures for building up soil fertility and the establishment of permanent systems of agriculture. Crop rotation is stressed. Additional plant food, deep and thorough plowing, and the growing and plowing under of green manure crops are among the soil-saving measures recommended.

- JACOT, A. P. (1975)
SOIL STRUCTURE AND SOIL BIOLOGY. Ecology 17: 359-379. July 1936.

After an historical review of the fauna of insects and larger invertebrates in agricultural soil, the writer discusses the biotic structure of old-field soil and of higher soils, and environmental factors in the soil. Work embodying the subjoined data as to quantitative samples of soil microarthropods was done as part of the stream-flow and erosion project at the Appalachian Forest Experiment Station. The author states: "Microarthropods are abundantly distributed throughout natural, vegetated soil to a depth of at least a foot. This animate layer varies in population with development of roots and rootlets. The lower limit of this layer is therefore indefinite, fraying out below as does the root layer. Soil erosion eliminates this porous, channeled layer with its makers. Resowing of this fauna is useless without precedence of a vegetative covering."

- JARVIS, C. S. (1976)
RAINFALL CHARACTERISTICS AND THEIR RELATION TO SOILS AND RUNOFF. Amer. Soc. Civ. Engin. Trans. 95 (Paper 1772): 379-458, illus. 1931.

"The purpose of this paper is to present summarized information regarding precipitation and its occurrence in various countries and latitudes; its relation to soils and run-off; the vegetative, topographic, and physiographic features of the watersheds; and the resultant influence on designs of drainage-structures and channels." A discussion of the paper is included.

- JEFFREYS, H.
PROBLEMS OF DENUDATION. Phil. Mag. and Jour. Sci. (6) 36: 179-190, illus. August 1918.

The stabilizing influence of vegetative cover during rainfall is discussed. "It reduces the rate of denudation as a whole, and when the soil under a grass or other plant with fibrous roots is removed it is possible that the exposed roots may act as a filter, thus increasing redisposition and counteracting denudational instability . . ."

- JONES, EWING (1978)
A ROOKIE LOOKS AT SOIL EROSION. The Land, Today and Tomorrow 1: 8-11, illus. November 1934.

Deplores the prevailing apathy of the farmers to the erosion problem and shows how easily soil wastage may be curbed in the Southwest.

- JONES, O. S. (1979)
REPLENISHING WORN-OUT WATER BEDS. Outdoor Amer. (n. s.) 1: 8-9, illus. March 1936.

Gives suggestions for recharging water beds and conserving seep water. Suggests simple diversion dam which would spread flood waters over areas of high porosity and absorb much of that water, thereby recharging shallow water gravels.

- KANSAS AGRICULTURAL EXPERIMENT STATION. (1980)
TREATMENT AND UTILIZATION OF FLOOD-DAMAGED LANDS. Kans. Agr. Expt. Sta. Bull. 121: 133-162, illus. 1904.

This bulletin contains the following papers on reclamation of flood-damaged lands and soil conservation: Renewing Washed and Sanded Lands, by A. M. Ten Eyck; Sand-Binding Grasses, by H. F. Roberts; and Trees for the Sanded Areas, by Albert Dickens.

KEFAUVER, P. F.

(1981)

PRACTICAL EXPERIMENTS IN RECLAIMING "GALLED" OR WASHED LAND, WITH NOTES ON MULCH AND MULCH MATERIALS. Tenn. Agr. Expt. Sta. Bull. 3: 65-72. 1890.

The writer describes nearly two dozen experiments made in Monroe County, Tenn., and advises planting galled lands to a good permanent sod. Mulch has many uses. It "preserves moisture in the soil for summer use, maintains a good capillary connection up to the very surface, prevents breaking and washing, protects it as a blanket in winter, adds vegetable matter to the soil by its decay, and generally livens up the soil . . ."

KERKHOVEN, A. R. W.

(1982)

WASH IN TEA GARDENS. Trop Agr. [Ceylon] 65: 84-89. August 1925.

"The various measures against wash with regard to their importance may be classified as follows: (1) contour drains; (2) planting the tea in horizontal rows with or without horizontal terraces; (3) 'water-holes' or 'catch pits'; (4) horizontal hedges of some sort, preferably leguminosae, or ground covering leguminosae; (5) regular upkeep." Contour drains on the fishbone system are advocated and explained.

KERR, H. W.

(1983)

SOIL EROSION. Queensland Agr. Jour. 47: 281-288. March 1937.

The author attempts to define the causes of erosion and lists the major factors affecting its intensity. He recommends and describes control measures such as tillage practices, vegetative coverings, terracing, and conveying water from higher to lower levels in artificial channels.

KETTUNEN, A. G.

(1984)

CONSERVATION PROGRAM FOR MICHIGAN 4-H CLUBS. Mich. Agr. Col. Ext. Club Bull. 29, 26 pp., illus. 1937.

"Conservation is a highly complex subject. We find an inter-relationship, an interdependency of many things. Fish and game are not our chief considerations, for to have good supplies of them it is necessary first to keep our waters unpolluted and our forests green. You have found or will find many of the fundamental principles of successful agriculture functioning in our wild lands and among our wildlife. It is necessary to recognize and to understand these fundamentals, for successful conservation practices begin with them." [Foreword.]

KING, BARRINGTON.

(1985)

A PROGRAM FOR EROSION CONTROL. Commonwealth 4: 7-9, illus. June 1937.

"Virginia's eleven-point erosion-control program represents an adaption of the best known methods of erosion control to actual farming conditions within the State. Under cooperative agreements with farmers in demonstration projects near Danville, Lynchburg, and Charlottesville, and in eleven CCC camp areas assigned to these projects, the program is being put into effect in these representative agricultural sections so that farmers throughout the State can see the effectiveness of the methods used under conditions similar to those found on their own farms." The program in its entirety is outlined.

KNAPP, G. S.

(1986)

WATER CONSERVATION AND UTILIZATION, FARM PONDS AND SUPPLEMENTAL IRRIGATION. Kans. State Bd. Agr. Rept. 66: 69-73. 1937.

Indicates interest taken by the State of Kansas in storing water. Mention is made of the early appreciation of the importance of storage of surface run-off as evidenced by the passage of a law in 1911.

KRAEBEL, C. J.

(1987)

EROSION CONTROL ON MOUNTAIN ROADS. U. S. Dept. Agr. Cir. 380, 45 pp., illus. 1936.

Destructive action of water on mountain roads and the movement of soil and rock loosened during construction of roads is believed largely responsible for eroded conditions. The author states the threefold purpose of his study: (1) To call attention to the seriousness of the problem; (2) to indicate preventive measures which can be incorporated in the planning and building of roads; and (3) to describe corrective measures

of more rational alinement, greater use of retaining walls and cribbing, tunnels and bridges, and improved drainage practice.

KRAEBEL, C. J. (1988)

WILLOW CUTTINGS FOR EROSION CONTROL. Calif. Forest Expt. Sta. Tech. Note 1, 3 pp. July 1933.

The author cites some of the uses of willow cuttings in erosion control: (1) control of active gullies in range meadows; (2) reenforcement and protection of small dams at the ends and sides, upstream and down, and at spillways; (3) protection of stream banks which are being cut by high water; (4) protection of bridge abutments and the toes of road and railroad fills reached by flowing water; and (5) fixation of new road fills composed of fine shifting material.

LAKE STATES CONSERVATION CONFERENCE. (1989)

REPORT OF LAKE STATES CONSERVATION CONFERENCE, MADISON, WISCONSIN, APRIL 24 AND 25, 1935. 27 pp. 1935. [Mimeographed.]

Section 5 of this report, pages 12-14, deals with erosion control and discusses the work program of the C. C. C. relief labor, and erosion-control agreements with farmers.

LANE, D. A. (1990)

ARTIFICIAL STORING OF GROUNDWATER BY SPREADING. Jour. Amer. Water-works Assoc. 28: 1240-1251, illus. September 1936.

The author contends that "water spreading has a definite place in the water supply in the Southwest." He describes the three general methods practiced, the ditch or furrow method, the basin or pondage, and the use of wells or shafts.

LARSON, C. A., ROCKIE, W. A., JOHNSON, A. J., AND MCGREW, P. C. (1991)

AGRICULTURAL ENGINEERING AND SOIL EROSION INVESTIGATIONS AT THE WASHINGTON STATION. Wash. Agr. Expt. Sta. Bull. 275: 63, 64, 67-70, 72, 74. 1932.

"The progress results of investigations on irrigation, specific conductance of soil and irrigation water, flume repair materials, vegetative control of erosion, terracing, operation of machinery on terraced land, effect of tillage, and effect on erosion of hogging of waste peas, and effect of erosion on cost of farm operations are briefly reported."—Expt. Sta. Rec. 68: 827. 1933.

LATHAM, B. M. (1992)

HOW BERRY GULLY WAS CONQUERED. Jour. Geogr. 36: 193-196, illus. May 1937.

Gives an account of how Berry gully in the South Tyger River area of South Carolina was checked and the surrounding land stabilized. Methods described are vegetative plantings, check dams, and sloped banks.

LEADLEY, T. A. (1993)

EROSION RUINS FARMS. Nebr. Farmer 76: 6, 14, illus. September 29, 1934.

This article discusses the work of the Soil Erosion Service in the Plum Creek district, Boone County, Nebr. A demonstration in erosion control is described embracing (1) proper terrace construction, (2) gully control, (3) contour cultivation and contour cropping, and (4) a revised cropping system. The author comments on C. C. C. cooperation and the obligations of those farmers who are directly aided by the program.

LEE, L. L. (1994)

NEW JERSEY SOIL CONSERVATION. N. J. Agr. 18: 3-4, illus. January-February 1936.

"Soil conservation is moving ahead in New Jersey. On a number of farms in the State's first demonstration project area, on the Neshanic Watershed in Hunterdon and Somerset Counties, mechanical erosion control structures have been built, fall planting has been done across slopes, certain acreages have been taken out of cultivation and seeded to permanent pasture, and spring [1936] will see the planting of more than 300,000 trees on the 300 acres which to date have been specified for forest cover . . ." New Jersey has three such demonstration areas, which are described.

LEHMANN, E. W.

(995)

WHEN A DEED WON'T HOLD A FARM. Capper's Farmer 45: 10, 33, illus. May 1934.

Experiences in terracing and better soil-management practices on farms in Williamson County, Ill., are described. The ways and means for terrace maintenance and a description of a V-shaped drag of value in this work are discussed.

LENTZ, G.

(996)

MAKING WATER WALK IN THE TENNESSEE VALLEY. Amer. Forests 40: 200-202, illus. May 1934.

Describes operations of the 20 C. C. C. camps in eastern Tennessee. Log check dams and cedar brush matting, staked down on eroded areas, are among erosion-control measures employed.

(997)

TENNESSEE VALLEY AUTHORITY'S ATTACK ON SOIL EROSION THRU REFORESTATION. Jour. Forestry 33: 570-573. June 1935.

The widely varied methods of controlling soil erosion through various Government agencies are reviewed.

— AND NICHOLSON, J. H.

(998)

HIGHWAY EROSION CONTROL FOR UTILITY AND BEAUTY. Highway Mag. 26: 268-271, illus. November 1935.

"The reforestation and soil erosion section, in cooperation with the agricultural division of the T. V. A. and the extension services of the states in the valley, is attempting to discourage the practice of emptying terraces into highway ditches wherever it is possible to find other outlets." An outline showing how the T. V. A. drainage systems are protecting both farms and roads from indiscriminate dumping of terrace water is given.

LEOPOLD, A.

(999)

GRASS, BRUSH, TIMBER AND FIRE IN SOUTHERN ARIZONA. Jour. Forestry. 22: 1-10. October 1924.

"The cumulative abnormal erosion which has occurred coincident with the encroachment of brush and the decimation of grass naturally has its worst effects in the siltage of reservoirs." The method of blockading the loosened material is a combination of mechanical and vegetative obstructions.

LESSING, F. C.

(1000)

FIVE YEAR FEED RESERVES. Capper's Farmer 47: 12, 27. July 1936.

This article tells how one farmer in Colorado stored feed for stock in times of plenty against years of want, and at the same time so arranged his cultivation and rotation that soil blowing was prevented.

LESTER-SMITH, W. C.

(1001)

SOIL EROSION. Trop. Agr. [Ceylon] 88 (2): 92-107, illus. February 1937.

"This publication was compiled on the suggestion of the Executive Committee of the Central Board of Agriculture that a summary of the Report of the Committee on Soil Erosion (Sessional Paper III of 1931) be published . . ." Erosion-control measures in Ceylon are presented in some detail. It is stated that the soil erosion committee considered it possible to control the movement of surface water and stop the downward movement of surface soil by vegetative means; drainage systems are to be regarded as a second line of defense against soil erosion. Various drainage systems are described. Mention is also made of other preventive works, such as stone terracing, construction of contour and individual platforms, and contour trench systems.

LEVINE, C. O.

(1002)

SOIL WASHING. Hoard's Dairyman, 59: 584-585. March 19, 1920.

"Hundreds of tons of valuable soil can be prevented from leaving the farm by using some means to dam the ravines at the sides of the farm . . ." Osage-orange stumps make excellent ditch and ravine stoppers.

- LINDLEY, J. G. (1003)
RELATION OF E. C. W. CAMPS TO SOIL EROSION SERVICE. *The Land, Today and Tomorrow* 2: 18-21, illus. February 1935.
This article briefly describes the work of 22 E. C. W. camps allocated in 1934 to the Soil Erosion Service.
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- SOIL CONSERVATION AND THE C. C. C. U. S. Soil Conserv. 2: 285-286, June 1937. (1004)
The author discusses the importance of erosion-control measures and mentions the cooperation of individual farmers in soil conservation programs.
- LIVINGSTON, L. F. (1005)
RESTORING OUR DISAPPEARING FARM LANDS. *Dupont Mag.* 30: 8-9, illus. October 1936.
"Some of the steps that must be taken to counteract a serious threat to our national welfare" are discussed; among them is the use of dynamite in the fight against erosion.
- LORD, L. (1006)
GREEN MANURES AND SOIL EROSION. *Trop. Agr. [Ceylon]* 73: 214-216. October 1929.
After a visit to Malaya, Indo-China, Sumatra, and Java in May 1929, the writer presents some notes on the use of green manures and on the methods of preventing soil erosion: "Soil erosion is prevented generally by silt-pits combined with continuous ridges." The construction and planting of these is described, and various plants used for cover and for turning under as manure are listed for Ceylon.
- LOWDERMILK, W. C. (1007)
TORRENT AND EROSION CONTROL IN JAPAN. *Amer. Forestry* 33: 474-478, illus. August 1927.
"To rule the river is to rule the mountain" (ancient Japanese proverb). Denuded slopes and growing erosion with dangerous floods in a certain part of Japan caused the area to be declared a protection forest. The author lauds "the faith, skill, technique, and strategy of the forest engineers. With a dam here and a dam there they had step by step robbed the torrential water of its transporting force; with buttress walls strategically placed they had prevented undercutting of slopes; with works of soil fixation on slopes where prostrate alder and grass were called into assistance they had reclothed eroding slopes with a preliminary vegetation. They had, in short, gradually diminished the progress of erosion . . ." Other examples of erosion control work are given, and the Forestry Act of Japan (1897) is cited. "The importance of torrent regulation, of erosion control, is signified by its general enforcement over the entire Empire of Japan."
- LYON, T. L., and FIPPIN, E. O. (1008)
THE PRINCIPLES OF SOIL MANAGEMENT. 531 pp., illus. New York and London. Macmillan Co., 1909.
The authors discuss the principles of soil technology and their application to soil problems from the standpoint of crop production. "Attention is called to the outline of contents which shows the method of treatment and the relation of the several parts of the subject . . ." Running water and wind are regarded as the chief causes of soil erosion. Recommended control measures are deep plowing, addition of organic matter for soil binding, underdrainage for saturated soil, various protective coverings of fine-rooted crops; contour farming, and sidehill ditches.
- McCLUNG, L. (1009)
SAVE YOUR PART OF THE EARTH. Illus. *World* 32: 743-745, 852, illus. January 1920.
Erosion-control methods are suggested, among them terracing, rock-lined ditches, sod, cover crops, and tree planting. The use of lime and marl is advocated to sweeten sour land.

- McGEE, W. J. (1010)
SHEETFLOOD EROSION. Geol. Soc. Amer. Bull. 8: 87-112, illus. 1897.
"There are in nature two strongly contrasted types of moving water bodies, namely, (1) streams, and (2) sheetfloods." The author discusses sheet floods and erosion in the Sonora district and other districts.
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- SOIL EROSION. U. S. Bur. Soils Bull. 71, 60 pp., illus. 1911. (1011)
"This bulletin discusses the agricultural duty of water, the duty of the soil, the natural and abnormal work of water in agriculture, and the remedies for soil erosion based on treatment of the soil by tillage, mulching, fertilizing, seasonable plowing, draining, and dust mulching; the treatment of cover by tree planting, grassing, nurse cropping, cover cropping, eradication of weeds and rotation of crops; the treatment of slopes by contouring, terracing, vineyarding, retain-walling, annular forestation, and grading; and the treatment of the water supply by regulating its movements."—Expt. Sta. Rec. 25: 425, 1911.
- McKIE, T. J. (1012)
THE CONSERVATION OF SOIL AND WATER SUPPLY OF HILL COUNTRIES IN CULTIVATED AREAS. Amer. Forestry Assoc. Proc. (Ann. Rept. Meetings 13, 14, Dec. 1894 and Jan. 1896) 11: 137-141. February 1897.
The writer deplors the destruction of forest cover and suggests rewards or penalties for protected or neglected lands. Furrowing and terracing are proposed to check soil washing.
- McLEAN, J. E. (1013)
SOIL CONSERVATION PRACTICES GROW IN POPULARITY. Prog. Farmer (Ga.-Ala. Ed.) 51: 10, illus. November 1936.
Practices followed in Alabama indicate the increased popularity of kudzu for hay, soil building, and erosion control.
- MAITTS, CHARLES B., JR. (1014)
SHE LIVES BY THE SIDE OF AN OLD-TIME MILL. Soil Conserv. 2: 66, 71. October 1936.
Silt and soil loss in Lancaster County, Pa., as demonstrated by the washing out of King's Dam on the Octoraro Creek.
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- SOIL EROSION. Pa. Farmer 116: 38, 39, illus. January 16, 1937. (1015)
Erosion control in Pennsylvania by the Soil conservation associations and the Pennsylvania Department of Forests and Water is discussed.
- MASON, ARTHUR J. (1016)
IS OUR CORN SOIL DOOMED? Farm Jour. 51: 13, 32-33. May 1927.
The writer points out the revolutionary change that will, in his opinion, have to be made in Corn Belt farming, if the loss of soil is to be arrested and the remnant saved.
- MATHEWS, JOHN L. (1017)
THE CONSERVATION OF WATER. 289 pp., illus. Boston, Small, Maynard & Co. 1910.
In this volume dealing with various phases of water conservation, flood control, irrigation, and drainage, the subject of soil conservation is treated, pages 220-224. The author attributes soil erosion to the removal of vegetation from hillsides and stream banks. Control methods of Germany and France are described and control measures for the United States recommended.
- MATTOON, W. R. (1018)
LANDS THAT RUN AWAY. Lit. Digest 52: 1696. June 10, 1916.
A State forest examiner tells what should be done, and what was then being done, in western Tennessee to prevent topsoil washing. "In good agricultural practice, constant care is required on slopes to plow, cultivate, and sometimes terrace parallel with the contour lines in order to stop incipient gullies that may start . . . The best policy for the future would be to convert the larger gullies into farm wood lots, serving the double purpose of checking further destruction of land and growing a supply of farm timber on the least valuable part of the farm."

- MECKEL, F. A. (1019)
CONTROL OF SOIL EROSION. *Kimball's Dairy Farmer* 17: 682-683, illus. July 1, 1919.
Methods of erosion control among them terracing, contour farming, and grass crops are discussed. Various types of dams to control gullies, and Mangum terraces are illustrated.
- MERCIER, W. B. (1020)
AN EFFECTIVE METHOD OF PREVENTING THE EROSION OF HILL LANDS. U. S. Dept. Agr. States Relations Serv. Doc. 41 (Ext. Serv. No. "A" 78) 8 pp., illus. April 30, 1917.
"Twin problems of agriculture, probably of equal importance, are: (1) the maintenance of soil fertility, and (2) water control." The writer discusses causes of worn-out land in the South, forms of water control, and various types of terrace building. Home-made terrace-building tools and their use are given consideration.
- MILLER, M. F. (1021)
CONTROL OF SOIL WASHING. *Mo. Agr. Expt. Sta. Cir.* 78, 12 pp., illus. 1915.
"Soil washing is the greatest single source of loss on many rolling lands. It is greater than the loss of plant food through cropping." The two kinds of soil washing and their causes are discussed, and control and prevention methods are described.
- and KRUSEKOPF, H. H. (1022)
STUDIES OF WATER ABSORPTION, RUN-OFF, PERCOLATION, EVAPORATION, CAPILLARY WATER MOVEMENT, AND SOIL EROSION UNDER FIELD CONDITIONS. *Mo. Agr. Expt. Sta. Bull.* 244: 51. 1926.
Describes briefly the results of a year's work in erosion control. Discusses the comparative merits of planting corn, clover, and soybeans.
- MISSOURI UNIVERSITY, COLLEGE OF AGRICULTURE, AGRICULTURAL EXTENSION SERVICE. (1023)
ANNUAL REPORT FOR 1936. *Mo. Col. Agr. Ext. Cir.* 357, 79 pp., illus. 1937.
On pages 52-55 results are given of the collective program of 49 soil-conservation associations with a membership of 8,000 farmers. "An increased capital value of \$166,040 was given 25,340 acres of sloping land through terracing. A total of 35,655 farmers followed crop rotation . . . approximately 400 farmers in 42 counties practiced strip cropping. The total number of farms upon which terracing has been done reached 2,918 and the acres protected 69,429." The author states, in part: "Farmers are rapidly learning the value of natural grass waterways in protecting areas subjected to harmful concentration of run-off water."
- (1024)
SOIL IMPROVEMENT BY THE MISSOURI PLAN. *Mo. Agr. Col. Ext. Cir.* 132, 4 pp. 1923.
The writer gives six essential principles for improving Missouri soils: Adopt a crop rotation which includes a good legume crop such as clover; return to the land all crop refuse such as stalks, stubble, and manure; use lime on acid soils; use phosphate or a high-grade mixed fertilizer; control soil erosion or washing; adapt the system of farming to the soil.
- MITCHELL, G. J. (1025)
EFFECT OF EROSION ON MINERALIZED AREAS IN NORTHERN SONORA. *Engin. and Mining Jour.* 110: 1081-1082, illus. December 4, 1920.
The removal of rock material has considerably lessened the depth of mineral deposits in northern Sonora, Mexico. The author discusses briefly various mineral deposits.
- MOORE, C. C. DU PRÉ. (1026)
PREVENTION OF SOIL EROSION IN NEW CLEARINGS. *Trop. Agr. [Ceylon]* 72 (2): 67-68, illus. 1929.
"The system advocated and found very successful is that of contour trenches (as opposed to drains). The earth from these is used to level the terraces above the trench and in forming an earth and stone 'bund' along the upper margin of the contour trench to assist in retaining the terrace. The system also contemplates the uprooting rather than the burn-

ing, of grass in the opening of new lands, the grass being left on the surface to rot down and increase the soil organic matter. A diagram and photograph illustrate the schème, which, in the trial here described, was applied to the preparation of new land for tea culture."—Expt. Sta. Rec. 62: 812. 1930.

MOORHOUSE, L. A.

(1027)

SOME SOIL PROBLEMS IN OKLAHOMA. Amer. Soc. Agron. Proc. 1: 234-238. 1907-1909.

The author discusses the relation of rainfall and wind to soil erosion and recommends various methods of soil conservation. The results of pot-culture experiments with several types of soil, and experiments with manure fertilizer are reported.

MORGAN, A. E.

(1028)

CONSERVING NATURAL RESOURCES. Civ. Engin. 4: 150-152, illus. March 1934.

"Soil erosion relates to power production as well as agriculture. One means of checking erosion is to build a series of small timber dams in strips across the forming gullies and to plant the banks around them with various plants whose root systems will consolidate." The author discusses coordination of hydroelectric power on Tennessee River, the need of new agricultural economy, and legal restrictions on use of land.

MORRISON, B. Y.

(1029)

PAINTING THE HILLS GREEN. Sci. Monthly 40: 173-177. February 1935.

Man has contributed largely to soil erosion through "deforestation, overgrazing, lack of adequate fire protection or poor cultural practices, all of which, different as they are in themselves, have the same basic menace, the destruction of the richer surface soils in which most plant life exists." It is this problem of rapid erosion with which the writer is concerned, and he contends that it can be prevented.

MOSES, D.

(1030)

PREVENTION OF SOIL EROSION. Farming in So. Africa 3: 965. September 1928.

The author discusses practical steps toward preventing soil erosion. After defining the different kinds of erosion he discusses the question of slope and its treatment including crops and permanent pasture, Mangum or ridge terraces and their construction, equipment, and cost. Methods of preventing gully or "sluit" erosion are given.

MUEHLEISEN, G.

(1031)

CONTROLLING MOISTURE, EROSION, AND FLOOD WATERS. Agr. Engin. 13: 208, illus. August 1932.

The author describes his own idea of erosion control. "Store and keep the surplus rainfall and melting snow water at home or near the area on which it falls." He then gives data for the building of ponds and dams. "The benefits derived would far exceed the cost in the way of controlling erosion, moisture, and flood waters."

MULLEN, C. W.

(1032)

EROSION ARMY PUSHES ON. Farmer-Stockman 49: 3, illus. June 1, 1936.

Describes erosion-control work in Oklahoma by the Soil Conservation Service in cooperation with the C. C. C. and E. C. W. Explains, also, the farmers' responsibility in erosion control.

(1033)

LOST: 440 MILLION TONS! Farmer-Stockman 48: 3, illus. February 15, 1935.

The writer thinks that flood control must begin with control of soil erosion and questions the wisdom of spending millions for ponds and lakes, soon filled up with soil and silt from washing fields. Terrace building is urgently recommended as the first measure in soil conservation with strip farming as a concomitant.

(1034)

STILL LEARNING AFTER 34 YEARS. Farmer-Stockman 50: 4, illus. January 15, 1937.

A Texas pioneer finds terracing beneficial. Blackberries and dewberries have been his best terrace-holding crops; for controlling his hilltops against blowing he uses rye.

MUNNS, E. N.

(1035)

CHAPARRAL COVER, RUN-OFF, AND EROSION. Jour. Forestry 18: 806-814. December 1920.

"An examination of certain burned-over areas on the Angeles National Forest, with special reference to the increase in soil erosion and a consequent decrease in herbaceous growth."—Expt. Sta. Rec. 44: 537. 1921.

MUSGRAVE, G. W., and NORTON, R. A.

(1936)

SOIL AND WATER CONSERVATION INVESTIGATIONS AT THE SOIL CONSERVATION EXPERIMENT STATION, MISSOURI VALLEY LOESS REGION, CLARINDA, IOWA. U. S. Dept. Agr. Tech. Bull. 558, 182 pp. illus. 1937.

This is one of the first publications dealing with the technical phases of the work of the soil-erosion stations which were organized under the Federal appropriation of 1930 for that purpose. It represents a comparatively new field of research in agriculture in which the methodology is largely undeveloped. Main headings are: Purpose and Plan of Experiments; Elements of the Control Problem; Infiltration; Surface Impounding; Vapor Losses; Surface Run-off; Strip Cropping; Erosion Control in Gullies and Terrace-outlet Ditches, and Checking Erosion at Terrace Ends; Experiments and Results of Run-off and Erosion from Terraced Areas. An appendix gives data on records of precipitation, run-off, erosion, and similar information for the period 1931-35.

MUSGRAVE, M. E.

(1037)

HELPING THE NAVAJOS HELP THEMSELVES. Indians at Work: 35-39, illus. February 1937. [Mimeographed.]

Tells what the Soil Conservation Service is accomplishing in erosion control at the Mexican Springs Station, N. Mex. The Navajos are becoming erosion conscious.

(1038)

NURSERY AT NAKAI BITO. A HARBINGER OF TOMORROW. The Land, Today and Tomorrow 2: 1-3. March 1935.

A brief account of the work of the soil erosion nursery at the Navajo experiment station. A list of plants grown is included.

MYER, W. E.

(1039)

TENNESSEE VALLEY LOOKS TO THE FUTURE; FORESTS AND SOIL; CHECKING SOIL EROSION. Jour. Natl. Ed. Assoc. 23: 238-239, illus. December 1934.

Soil erosion in the Tennessee Valley presents three factors: "A great deal of the land slopes steeply; the soil is especially soft; and the rainfall is very heavy." Work of the T. V. A. on this problem includes cooperation with farm bureaus and other organizations. "But in the long run effective erosion prevention throughout the valley must be effected, not through the positive acts of the TVA or any other central organization but through the enlightened efforts of the farmers themselves . . ."

NEEL, L. R.

(1040)

FARMING THAT WILL LAST. South. Agr. 63: 5, 20, illus. October 1933.

This article discusses soil erosion in the Southwest. Control methods recommended are: Vegetative covering and forestry; the substitution of small grain for cotton, peanuts, corn, and tobacco which are said to encourage erosion; winter cover for cultivated lands; and terraces.

(1041)

THIRD STAGE IN AMERICAN AGRICULTURE. ALFALFA AND OTHER LEGUME CROPS, AID IN BUILDING AND HOLDING SOIL. South. Agr. 67: 10, illus. June 1937.

This article states that the third stage in American agriculture is "that of soil building and conservation."

NELSON, RUFUS J.

(1042)

CORRECT LAND USE SHOWING RESULTS. Farm and Ranch 55: 2, 14, illus. January 1, 1936.

An account of how cooperation of farmers with the Soil Conservation Service in Arkansas resulted in increased food and feed crops through saving soil and conserving rainfall. A survey of percentages in 1935 over 1933 with details of methods used are given.

- NEWLIN, J. J. (1043)
CONTROLLING EROSION WITH OLD WOVEN WIRE. Wallaces' Farmer 44: 1259.
June 20, 1919.
Advocates the use of old wire fencing for the damming of wide ditches and gullies in Iowa.
- NEWMAN, C. L. (1044)
FARM DRAINAGE. Ark. Agr. Expt. Sta. Bull. 32, pp. 33-54. December 1894.
"The almost total neglect of protection from washing of hillsides and of reclamation of wet lowlands in South and East Arkansas, suggested the writing of this bulletin." The protection of soil from surface washing, the treatment of hillside ditches, the use of terraces, drainage of wet lands, and of open and covered ditches with details as to various types of drainage, are discussed.
- NICHOLS, ALICE. (1045)
CONTROLLING EROSION ON THE COASTAL PLAINS. Soil Conserv. 2: 12-13, illus.
July 1936.
Describes new devices tested in New Jersey for water and soil conservation which should be applicable in other Coastal Plain States.
- MINDFUL OF TOMORROW. N. J. Club Woman 10: 7. March 1936. (1046)
States that New Jersey farmers are employing such methods as strip cropping, contour farming, graduated watercourses, diversion ditches, and grassed waterways for control of erosion and conservation of water resources.
- NICHOLS, F. B. (1047)
THIEVES IN FARMERICA. Successful Farming 33: 14-15, 58-59, illus. November 1935.
This article describes the work of the Bethany Soil Erosion Experiment Station at Bethany, Mo., in aiding local farmers to check soil erosion. The most effective methods of erosion control described are (1) contour farming, (2) strip cropping, (3) terracing, and (4) various methods of gully control.
- NICHOLS, M. L., AND SEXTON, H. D. (1048)
A METHOD OF STUDYING SOIL EROSION. Agr. Engin. 13: 101-103, illus. April 1932.
Various means of erosion control have been advocated for many years. "As a result, terraces and cover crops are considered by the better farmers as a necessary part of any sound system of crop production on rolling lands." The method employed by the Alabama Agricultural Experiment Station in studying erosion and effect of rate of rainfall is described in detail with the aid of tables and diagrams.
- NICHOLSON, J. H. (1049)
EROSION CONTROL IN THE TENNESSEE VALLEY. Agr. Engin. 17: 509-510, illus. December 1936.
Work by C. C. C. camps in the Clinch-Powell watershed for the purpose of effecting erosion control to protect Norris Lake is described. The cooperation of landowners and farmers in erosion-control work is stressed.
- NORTH CAROLINA AGRICULTURAL EXTENSION SERVICE. (1050)
SAFEGUARD THE GAINS OF SOIL CONSERVATION. N. C. Agr. Ext. Cir. 216, 14 pp., illus. 1937.
Sets forth the principles of maintenance of soil and water conservation practices. Deals with crop rotations, strip cropping, pastures, terraces, gully control, wood lots, and wildlife.
- NORTH CAROLINA DEPARTMENT OF CONSERVATION AND DEVELOPMENT. (1051)
NORTH CAROLINA: TODAY AND TOMORROW. 270 pp., illus. N. C. Dept. Conserv. and Development. 1936.
This volume, dealing with the utilization of natural resources in the State, contains, on pages 265-267, a brief review of soil-conservation conditions and a proposed program embodying crop rotations, vegetative restoration, and terracing.

- OHIO STATE WATER CONSERVATION BOARD. (1052)
FIRST AND SECOND BIENNIAL REPORTS . . . AUGUST 12, 1931, TO DECEMBER 31, 1934. Ohio State Water Conserv. Bd. 49 pp. 1935.
Pages 9-10 contain a discussion as to what the Federal and State Governments are accomplishing in erosion prevention.
- OKESON, C. J. (1053)
EROSION CONTROL IN SALINA CANYON. Utah Acad. Sci., Arts and Letters Proc., 11, 300 pp. July 1934.
On pages 143-145 rock characteristics as a factor in flood control and geologic features of importance in Salina Canyon are discussed. The author says of rodents: "They not only aid erosion by destroying part of the vegetative covering but also by forming well defined channels in which the rain and groundwater can flow toward the larger gullies. The main part of the erosion control program in this region consists of the building of dams across the main gully channels."
- OLSON, LOIS. (1054)
SOIL CONSERVATION IN ANTE-BELLUM VIRGINIA. Commonwealth 4: 13, 35, illus. April 1937.
A description of how erosion, one of Virginia's most vital problems of the present day, was met by early Virginia farmers, who put into practice many of the methods now being promoted on a Nation-wide scale by the Federal Government.
- OVERHOLT, V. (1055)
CONTROL OF SOIL EROSION. Agr. Engin. 3: 47-48. March 1922.
Erosion control methods in Ohio are discussed, such as broad-base or Mangum terraces, earth dams, straw and brush dams for controlling gullies, and sod strips to stop soil washing.
- OWEN-COLLETTE, J. (1056)
EROSION STOPPERS. Farmer's Weekly (Union So. Africa) 45: 1053. July 26, 1933.
On the effectiveness of wire netting and stock control to prevent erosion. The advantages of contour netting over furrows is stressed.
- PARTRIDGE, N. L. (1057)
SOIL EROSION IN MICHIGAN ORCHARDS. Mich. Expt. Sta. Bull. 162, 35 pp., illus. 1937.
This bulletin brings together the results of other published data on systems of cover cropping, intercropping, cultivating, fertilizers, and soil management in general. The author discusses various methods of controlling erosion on fruit plantations.
- PAULSEN, M. (1058)
RIVER PROTECTIVE WORK. New Zeal. Jour. Agr. 19: 271-276, illus. 1919.
"Operations for the successful protection of farm land against a small river, by the use of groynes and the planting of willows in the river bed are described."—Expt. Sta. Rec. 42: 780. 1920.
- PETERSON, A. I. (1059)
NORTH DAKOTA LOOKS AT WATER CONSERVATION. Game Breeder and Sportsman 40: 246, 260. December 1936.
"We find that the first settlers had only to dig down from 6 to 10 feet to get an abundance of water . . . Today, we find that practically all over the State we have had to resort to deep wells for the necessary water to supply our needs . . ." Continuous tapping of the ground for increased population of man and beast has caused lowering of the water level.
- POE, CLARENCE. (1060)
REVIEWING THE WORLD'S NEWS. AMERICA'S MOST IMPORTANT 1936 CAMPAIGN SUMMARIZED. Prog. Farmer (Ky.-Tenn. Ed.) 51: 38. August 1936.
The author discusses the Nation-wide campaign to save the soils of the United States as "the most important issue of the 1936 campaign," and presents a suggested eight-plank soil-building platform dealing with the following: Interest of farm people; climatic influences on land; need for soil humus; soil washing; livestock; forest fires; abandoned croplands; and home ownership.

PORTER, J. F. (1061)
THE MATTER OF SOIL EROSION. Bur. Farmer (Tenn. Ed.) 10: 173-177. July 1935.

The author emphasizes the need of getting information on erosion control to the farmer. Terracing and permanent pasture to build up the soil are advocated.

PRICE, FITZHUGH. (1062)
THE ABC'S OF CONSERVATION. South. Agr. 67: 35, illus. February 1937.

This article points out the advantages of terracing to control erosion and also recommends the planting of Bermuda grass, clover, and vetch. The author maintains that the root system of the black locust is superior to pine in holding the soil together.

PUERTO RICO AGRICULTURAL EXPERIMENT STATION. (1063)
EROSION AND TERRACING. Puerto Rico Agr. Expt. Sta. Rept. 1934: 20. 1934.

On the successful planting of terrace banks with *Cordyline guineensis* to prevent soil washing.

REPORT . . . 1935. Puerto Rico Expt. Sta. 34 pp. illus. Washington, Govt. Print. Off. 1936. (1064)

The need is stressed for studies of measures to check erosion together with restoration of plant nutrients to depleted soils.

PURDUE, A. H. (1065)
THE GULLIED LANDS OF WEST TENNESSEE. Resources of Tenn. 3: 119-136, illus. July 1913.

This paper gives a general description of erosion conditions and recommends various control methods, namely, deep plowing, log and brush dams, grass plantings, and reforestation. Japan clover, Bermuda grass, and honeysuckle are suggested for grass planting, and yellow poplar, black walnut, and locust for reforestation.

RAMSER, C. E. (1066)
EROSION CONTROL ON THE FEDERAL PROJECTS. Agr. Engin. 11: 135-140, illus. April 1930.

The writer discusses research work of the experimental farms relating to soil erosion in the red lands of Texas and Oklahoma, the black lands of Texas and Kansas, the gray lands of Missouri and Iowa, and the sandy lands of Arkansas, Louisiana, and Texas. Data on the various experiments carried on by the Federal projects are given.

OUTLINE AND SUMMARY OF ENGINEERING EXPERIMENTS ON EROSION CONTROL ON THE TEN SOIL EROSION EXPERIMENT STATIONS. U. S. Soil Conserv. Serv. SCS-EP-1, 65 pp. January 1935. [Mimeographed.] (1067)

"In general, the experiments outlined here were conducted by the Bureau of Agricultural Engineering in cooperation with the Bureau of Chemistry and Soils." The article presents important data on the construction, design, and maintenance of terraces, tillage methods, vegetative covers, strip cropping, gully control, and control and prevention of wind erosion.

RAST, L. E. (1068)
THE RIVERS OF GEORGIA RUN RED TO THE SEA. Ga. Agr. 14: 3, 22, illus. October 1936.

Erosion-control operations in Georgia by the Soil Conservation Service with cooperation of the Civilian Conservation Corps is described.

REED, R. H. (1069)
SELF-HELP IN APPANOOSE. Country Gent. 106: 12-13, 38, illus. November 1936.

An account of the self-help plan in Appanoose County, Iowa, "which may, in the opinion of many agricultural leaders, serve nicely as a blueprint for an efficient machine to fight soil erosion."

REINHARDT, JULES.

(1070)

HOW EROSION IS PREVENTED ALONG ROADS IN WISCONSIN GLACIAL REGION. Highway Mag. 19:21-22, illus. January 1928.

"Since erosion, treating it in the abstract, is dependent on the velocity of the water, the solution of a particular problem usually requires either (1) armoring the eroding soil with a surface tough and smooth enough to resist scouring, (2) enclosing the water in a channel or pipe having a similar resistance to erosion, or (3) checking the velocity by reducing the gradient, which of course requires providing for spillways where the fall to a lower level can be accomplished abruptly yet under complete control . . . This plan not only protects the highways from hill-side debris but results in building up fissured farm land to its original level."

RICHARDSON, T. C.

(1071)

A COUNTY GOES TO SEA. Farm and Ranch 54:2, 18, illus. February 15, 1935.

It is pointed out that "flood control starts with forests, terraced fields, and well-grassed pastures which slow up and reduce run-off and store water in the soil." The program for saving city and county with particular reference to work done in Texas is discussed.

(1072)

SAVE THE PEOPLE BY SAVING THE SOIL. Farm and Ranch 54 (7): 3; (8): 2, 7, 12, illus. April 1 and 15, 1935.

Outlines the work of the extension service in Texas and Oklahoma, and the cooperative efforts of the farmers with various State committees and associations in checking soil erosion. The article also describes the work of the State legislature in forming future erosion-control policies.

(1073)

SAVING THE SOIL IS SAVING ALL. Farm and Ranch 53:4, 10, illus. May 15, 1934.

Terracing in Collin and Hunt Counties, Tex. The farmers solve their terracing problems with the aid of the C. C. C., the county officers also cooperating. The author explains the advantages of a cooperative system.

RINGLAND, ARTHUR C.

(1074)

SYBARIUS: AN EXAMPLE OF WATERSHED CONTROL IN OPERATION. Soil Conserv. 3:11-13, illus. July 1937.

The author discusses watershed protection at the Sybarius project in southern Italy. The project comprises 347,443 acres of mountains and hilly area and 79,099 acres of plains. Data are given on stream-bank sliding, water diversion, and soil conservation financing.

ROBERTSON, C. L., and HUSBAND, A. D.

(1075)

RESULTS FROM GLENARA SOIL CONSERVATION EXPERIMENT STATION. Rhodesia Agr. Jour. 33:162-172. March 1936.

Reports results of experiments to determine relative efficiencies of two types of ridges in reducing erosion and flood run-off at an experiment station and also to supply data as to the peak rate of discharge during rainstorms of particularly heavy intensity and thus afford an indication as to the height of ridge necessary to insure protection under the severest of conditions.

ROCKIE, W. A.

(1076)

EROSION CONTROL IN THE WHEATLANDS OF THE PACIFIC NORTHWEST. Soil Conserv. 1:14-15, August 1935.

"The program of erosion control simply involves some common sense principles of safe use of the land."

ROE, H. B.

(1077)

PRESENT STATUS OF SOIL EROSION PROGRAM. Impl. and Tractor 51: 14, May 30, 1936.

Various methods employed by agencies of the national program for soil conservation are outlined, among which are: Vegetative and engineering measures; land classification; crop rotation; controlled grazing; economic studies; rodent control; wildlife conservation; weed, insect, and disease control in field plantings.

- ROE, H. B. and NEAL, J. H. (1078)
SOIL EROSION CONTROL IN FARM OPERATIONS. Minn. Agr. Col. Ext. Spec.
Bull. 170, 20 pp., illus., 1935.

"Many simple practices in farm operation that the farmer may apply without outside help will be of great aid in controlling erosion on the farm. Likewise there are many of the common practices that he should avoid because they further erosion. To present these practices for the farmer's consideration and guidance is the purpose of this bulletin." Terracing with strip cropping, gully control and elimination, and control of sheet erosion are among the problems discussed.

- ROTHROCK, J. T. (1079)
Pinus rigida ON THE DUNES AT CAPE HENLOPEN. Forest Leaves 2: 83-85.
August-September 1889.

In considering pitch pine (*Pinus Rigida*) the writer says: "Today you will find it growing on a rich soil, tomorrow on a slaty ridge, then on a rugged mountain slope, and again on a sandy shore line where no other of our trees can maintain itself." A comprehensive description of the pitch pine is given of its growth along the eastern coast of New England.

- ROUDEBUSH, L. (1080)
PREVENTION OF EROSION. Ohio Farmer 140: 133. August 25, 1917.

The writer contends that "the drainage of the soil plays a very important part in preventing erosion . . . For the present, underdrainage, cover crops and humus must be emphasized as never before in our Ohio River Valley."

- (1081)
SOME METHODS OF CONTROLLING EROSION. Ohio Farmer 138: 221-222, illus.
September 9, 1916.

The writer presents photographically the subdivision of a 200-acre farm into 30-acre tracts, each under different management. Results of grass and tree planting for soil building and holding are contrasted with other methods involving soil erosion and destruction of fertile land.

- ROUND, G. (1082)
ON THE LEVEL WITH ROUGH LAND. U. S. Ext. Serv. Rev. 6: 115, 123, illus.
September 1935.

The writer describes the help given farmers by county agents in establishing an erosion-control program in Nebraska. "Farmers in this county have partially remade the topography of their land by cooperating in what probably is one of the most successful soil-erosion projects in the Middle West."

- RUMMELL, L. L. (1083)
LOST—GOOD HILL LAND FARM! DISAPPEARED DOWN THE RIVER AFTER RAIN. Ohio Farmer 177: 10. April 25, 1936.

The writer describes demonstration plots and experiments as observed at the soil-erosion experiment farm near Zanesville, Ohio, and discusses prevention of soil losses.

- RUSS, G. W., and JUDD, C. S. (1084)
PLAN FOR THE PLANTING OF THE ERODED AREAS ON THE KAHAIKI RIDGE NEAR KALII, OAHU, BY THE U. S. ARMY IN COOPERATION WITH THE BOARD OF AGRICULTURE AND FORESTRY. Hawaii. Forester and Agr. 27: 206-208, illus.
October-December 1930.

"The object sought by this plan is to establish a forest cover on the eroded areas on the Kahauiki Ridge which are visible from the Honolulu waterfront, in order to prevent further erosion of the soil in this region." This plan is followed by a progress report, describing the work done and trees planted with results obtained to date. Photographs of the operations and the results in tree growth accompany the report.

- RUTHERFORD, D. M. (1085)
SOIL FERTILITY IS ONLY SKIN DEEP. Pacific Rural Press 132: 651, illus.
December 12, 1936.

Soil-conserving practices in California include long and short furrows, check dams and contour checks, gully control, cover crops. The need for experience and research into soil-conserving methods is stressed.

- SARGENT, J. W. (1086)
 VALUE OF SAVING SOIL. *Ark. Gaz. Mag.*, p. 3, illus. March 7, 1937.
 "Tests made on unprotected and protected fields in the Arkansas project areas have shown that on cultivated fields and pasture areas protected with erosion control measures and practices, moisture is stored to a depth of twice as much as on similar areas which are untreated."
- SAVILLE, THORNDIKE. (1087)
 WATER RESOURCES STUDIES. *Engin. News-Rec.* 116: 220-222. February 6, 1936.
 By virtue of his connection with the Water Planning and Water Resources Committees, the author tells about the coordinated movement to explore the Nation's stock of water resources and the plan for their systematic conservation and utilization. Early and current activities are discussed together with future trends and potentialities.
- SCHERER, G. C.
 SIMPLE MODE OF ARRESTING SHORE EROSION. *Engin. News* 58 (26): 700, illus. December 26, 1907.
 The author describes the construction of post and board fences to catch sand. Another protective measure is to build groins of bags of beach sand, "which bags of sand having no greater specific gravity than the sand upon which they rest, do not imbed of their own weight, but serve to catch and arrest the particles of sand in suspension during the ordinary prevailing winds of the seashore."
- SENANAYAKE, R. (1089)
 SOME PRACTICAL NOTES ON THE PREVENTION OF SOIL EROSION UPON ESTATES. *Trop. Agr. [Ceylon]* 66: 256-261. April-May 1926.
 Attempts to counteract soil wash are described. The successful one, initiated by the owner of the estate after a visit to Italy where he had seen a very fine system of contour stone terracing, is discussed in detail.
- SHAPINSKY, R. B. (1090)
 RECLAIMING ERODED LANDS. *Farm Engin.* 5: 8. March 1917.
 Shows effectiveness of damming, blasting, and planting in restoring erosion-destroyed land to usefulness.
- SHAW, C. F. (1091)
 EROSION PAVEMENT. *Geogr. Rev.* 19: 638-641, illus. October 1929.
 Erosion pavement is defined as "a surface covering of stone, gravel, or coarse soil particles accumulated as the residue left after sheet or rill erosion has removed the finer soil." The author illustrates erosion pavement in Santa Monica, Calif.
- SHAW, FRANK R. (1092)
 CONSERVING OUR NATIONAL WATER RESOURCES. *Jour. Amer. Waterworks Assoc.* 28: 757-769, illus. June 1936.
 Address before Indiana section of the American Waterworks Association, April 8, 1936. A consideration of the problem of conserving our national water resources in connection with the various forms in which and places wherein water exists and the changes and effects which transpire in its travels, as well as the uses to which it is put. Shows that water for human consumption is either directly or indirectly affected by silt, lowering of the ground water table, decrease of infiltration, low stream flows, and floods.
- SHEPPARD, J. H. (1093)
 WRONG SIDE UP. *N. Dak. Agr. Col. Ext. Cir.* 45, 4 pp., illus. 1921. Reprinted 1935.
 The author explains that "'Wrong side up' is a picture of an old Indian turning back the freshly plowed prairie sod and saying to the new settler, 'wrong side up' " an actual occurrence with an old Sioux Indian and John Christiansen of New Salem in 1883. The point is stressed that a large percentage of the land is too hilly and stony for cultivation and should have been left in natural prairie grass for cattle.

SHORT, A. K.

(1094)

THE NECESSITY FOR SOIL CONSERVATION. Jour. Amer. Soc. Agron. 21 : 433-438. April 1929.

The author describes the cooperation of the Federal Land Bank of Houston, Tex., with the extension service of the Agricultural and Mechanical College of Texas in an organized State-wide soil conservation program. This consists of three primary objects: (1) To teach more men and boys to use the farm level and to run terrace lines; (2) to impress upon farmers and businessmen the importance of soil and plant-food conservation; (3) to demonstrate building an adequate terrace. Texas has more than 450,000 farms, and the author states that more than 300,000 would be benefited by terracing.

SIMMONS, J. R.

(1095)

ANGULAR SUBMERGED TREE PLANTING. Jour. Forestry 22: 19-21. October 1924.

A description of property near Albany, N. Y., where soil erosion was retarded by laying willow logs in shallow trenches along the slope of the bank. "In many cases willow logs laid on the ground in extremely sandy areas, and covered with a light layer of earth, have survived and aided materially in reclaiming the areas . . ."

SIMS, A. J.

(1096)

EROSION IS SOIL ROBBER NUMBER ONE. Agr. Leaders' Digest 17: 10. March 1936.

Statistics are given on the removal of plant-food elements by erosion.

SMITH, A. G.

(1097)

KEEPING THE LAND AT HOME. Country Gent. 89: 10. illus. February 2, 1924.

The author divides land into five general soil-erosion classes. Methods of erosion prevention and moisture conservation are discussed. Contour plowing and terracing are stressed, and their use in South Carolina is shown.

SMITH, BERNARD.

(1098)

WATER SUPPLY. Geography 20 (108-pt. 2): 75-85, illus. June 1935.

"In water-supply the inorganic control is exemplified by such factors as rain fall, shape of ground, lie and nature of water-bearing strata, water levels, and so on; and the organic response is in the siting of villages and towns or the efforts of men to obtain, conserve, and control local supplies of water, or acquire them from a distance."

SMITH, CHESTER.

(1099)

PRACTICAL FARM EXPERIENCES IN SOIL-EROSION CONTROL. Kans. State Bd. Agr. Quart. Rept. 49 (193A): 37-46. 1930.

Address, followed by a discussion, at the Kansas Agricultural Convention in 1930. The author discusses the comparative merits of various types of terraces in erosion control. The discussion covers the construction of spillways, terraces, cover crops, subsoiling, and wind erosion.

SMITH, H. P., AND OTHERS.

(1100)

AGRICULTURAL ENGINEERING INVESTIGATIONS AT THE TEXAS STATION. Tex. Agr. Expt. Sta. Rept. 1931: 96-98, 113-116, 133, 134, 140, 141. 1931.

"The progress results are briefly presented of studies on the mechanical harvesting of cotton, factors of efficiency in the distribution and placement of cottonseed and fertilizer, soil erosion, types of terraces, soil erosion prevention and moisture conservation by strip cropping, strip subsoiling and terracing, and run-off in relation to soil erosion. The work on soil erosion and related features is being conducted in cooperation with the U. S. D. A. Bureaus of Agricultural Engineering and Chemistry and Soils."—Expt. Sta. Rec. 67: 750. 1932.

SNELL, BERTRAND H.

(1101)

SOIL EROSION AND CONSERVATION. Cong. Rec. 2510-2511. February 20, 1936.

Suggests that adequate appropriations be made in the interests of a sound soil conservation program.

- SOCIETY OF AMERICAN FORESTERS.** (1102)
REPORT OF THE COMMITTEE ON SOIL EROSION. *Jour. Forestry* 35: 194-197. February 1937. [Also published in *Forestry News Digest*, March 1937, p. 7.]
Discusses the following recommendations: (1) That the committee be authorized to broaden the scope of its activities to include all phases of watershed protection on wild lands; (2) that foresters realize the need and value of other technical practices to supplement forestry techniques; (3) that preparation for watershed protection should include a general 4-year forestry course, and (4) that research in this field requires 1 or more graduate years of specialized training. Presented at thirty-sixth annual meeting, Portland, Oreg., December 14-16, 1936.
- SOUTH AFRICA DEPARTMENT OF AGRICULTURE AND FORESTRY.** (1103)
REGULATIONS GOVERNING THE ANTI-SOIL EROSION AND SMALL DAM SCHEMES. So. Africa Dept. Agr. and Forestry Cir. 22, 37 pp. 1937.
- [SPILLMAN, W. J.]** (1104)
CONSERVATION OF RAINFALL. MEMORANDUM ON THE WORK OF COL. FREEMAN THORP ON HIS FARM AT HUBERT, MINN. 63d Cong., 1st sess., S. Doc. 228, 5 pp. 1913.
The writer examined the farm of Col. Thorp, including the forest plantations, and studied the interesting methods which he has there developed. He discusses a number of important problems worked out by Col. Thorp in connection with farming. An embankment system for conserving rainfall is described, and an extract from the *Kansas Farmer* is included subtitled "Contour Farming in Kansas."
- STANFORD, J. E.** (1105)
MAKING NATURE BEHAVE. *South. Agr.* 66: 5. November 1936.
The author recommends a well-directed regional program including proper utilization of land, prevention of overgrazing, strip cropping, contouring, and planting of shelterbelts to prevent excessive erosion.
- STARCH, ELMER, AND KURTZ, L. I.** (1106)
STUBBLE BURNING. *Mont. Agr. Col. Ext. Bull.* 99, 8 pp., illus. 1929.
"Stubble burning has been practiced for only a few years in Montana and the ultimate effect upon the soil has not yet been determined. Some authorities are against the practice because of the loss of organic matter and plant food contained in the straw. Stubble burning should not be practiced on soils that have started to blow. Burning in the fall is not recommended inasmuch as the stubble should be left to hold snow and to aid in the control of soil blowing." Stubble-burning machines and their costs are discussed.
- STEEL, W. A.** (1107)
SOIL CONSERVATION IS NOW FARMER'S OWN JOB. *Farm and Ranch* 55: 19. December 1, 1936. [Also in *Impl. Rec.* 33: 18, November 1936, and in *Farm Machinery and Equipment* 1935: 10. November 15, 1936.]
The importance of soil conservation demonstrations and the effect on the thought of farmers are discussed. The author's conviction is that future conservation is the responsibility of the individual farmer. Terracing costs are quoted.
- STEWART, GUY R.** (1108)
THE PUNJAB PLANS A COORDINATED ATTACK. *Soil Conserv.* 3: 14-17, 21, illus. July 1937.
This article reviews the topographic and climatic features of India. An important factor affecting plant cover in India is the fact that the Hindu considers the cow as a sacred animal. The resultant overgrazing as a factor in soil erosion is pointed out, and a proposed program to develop fodder resources for local livestock and to improve standards of cultivation is outlined.
- SWAIN, G. F.** (1109)
THE INFLUENCE OF FORESTS ON CLIMATE, FLOODS, AND EROSION. *Engin. News* 63: 427-429. 1910.
The author takes issue with the conclusions of the Chief of the United States Weather Bureau.

TENNESSEE VALLEY AUTHORITY.

(1110)

ANNUAL REPORT . . . FOR THE FISCAL YEAR ENDED JUNE 30, 1935. Tenn. Valley Authority, 90 pp., illus. Washington, Govt. Print. Off. 1936.

In addition to the three major phases of its program, the activities of the Tennessee Valley Authority in erosion control are described under Agricultural Planning and Demonstrations, pages 39-41, and Forestry Planning and Demonstrations, pages 41-43.

THOMPSON, A. T.

(1111)

THROUGH MISSOURI'S CORN COUNTRY. Wallaces' Farmer 55: 1882. December 6, 1930.

"It is rather interesting that men who advocate soil-saving methods find more sympathy among older farmers than among their sons and grandsons . . ." The author believes that the pioneer, in his span of years, has watched cultivation and its effect from the virgin-sod period on down. Terracing, contour planting, and the use of limestone in Missouri's corn belt are advocated.

THOMPSON, J. P.

(1112)

SOME RELATIONSHIPS BETWEEN THE SOIL CANYONS OF CERTAIN SOUTHEASTERN WASHINGTON VALLEYS AND SUMMER-FALLOW CULTIVATION. Northwest. Sci. 10: 8-11, illus. February 1936.

A discussion of the soil canyons of the Columbia lava plateau valleys, their geologic history, and accelerated erosion in these regions resulting from summer-fallow cultivation.

THORP, W. E.

(1113)

SAVING THE HUMUS. Wallaces' Farmer 44: 2092. October 17, 1919.

In a letter from Johnson County, Iowa, the writer describes the accumulation of humus-laden silt brought down from upland farms in the form of drainage. The use of Mangum terraces for conserving soil and water and the use of dams for prevention of undue enlargement of the channel are suggested.

TIMSON, S. D.

(1114)

NATURAL PROTECTION FROM SOIL EROSION. Rhodesia Agr. Jour. 34: 146-158. February 1937.

Suggestions for erosion control in Rhodesia are offered. "There is not sufficient experience available at present to dogmatise as to the types of plants best suited to the special conditions arising on the sides of gullies, where the sub-soil is completely exposed, and this is a problem of some difficulty owing to the marked infertility of the sub-soil in the red, chocolate, and black loam soil areas; but definite recommendations can be made with regard to grassing the wet vleis, and dry valleys, which are not yet severely eroded, and which are being utilized as the channels to receive the water from contour ridges and storm drains."

TOWL, R. N.

(1115)

SCHEIFELE SYSTEM OF RIVER BANK PROTECTION. Agr. Engin. 10: 36. January 1929.

Briefly describes a means of river-bank protection introduced by O. S. Scheifele, of Waterloo, Ontario, involving a new system of angular or inclined tree planting.

TURNER, A. W.

(1116)

METHODS OF CONTROLLING SOIL EROSION. Breeder's Gaz. 78: 296. August 19, 1920.

"In general the secrets of erosion control are to build up the physical condition of the soil, to use sod pavement for carrying the water, prevent the water gaining too much momentum, and to block the dirt but let the water escape." Methods for handling ditches and various types of dams are discussed.

[UHLAND, R. E.]

(1117)

FERTILIZING AND SOIL EROSION. Science 80 (Sup.): 6-7. November 23, 1934.

"Fertilizing and liming soil pays not only in increased crop yields but indirectly in decreased losses of topsoil due to erosion." In an address

at the Iowa State College of Agriculture and Mechanic Arts, the writer stressed this point and described experiments near Bethany, Mo., and results.

UHLAND, R. E. (1118)

HIS 238 ACRES STAYED HOME. JOHN TEBBEN WORKED OUT HIS SYSTEM OF EROSION CONTROL 60 YEARS AGO; HIS RECORDS SHOW WHAT WE MAY EXPECT OF OUR LAND. *Successful Farming* 35: 19, 66-67, illus. February 1937.

Describes a pioneer's conservation program of building dams and plowing furrows along the slopes of a northeastern Iowa farm. "Soil conservation Service technicians estimate that the farm has from $\frac{1}{4}$ to $\frac{1}{3}$ more top soil left on cultivated fields than similar farms in the community which have not received protection against soil erosion."

ULLMAN, C. G. (1119)

EROSION—THE PLANT FOOD ROBBER. *Pacific Rural Press* 133: 337. March 6, 1937.

Outline of erosion studies conducted by the Soil Conservation Service at the Las Posas project during the cropping season of 1935-36.

ULLMAN, CORNELIUS G. (1120)

WHY FARM ERODED SOIL? *Soil Conserv. Digest* 3 (2): 2-4. November 1936. [Mimeographed.]

Yield studies conducted by the Soil Conservation Service in the Las Posas project during the past cropping season (1935-36) indicate lower lima bean yields on soil suffering from soil erosion. A reduction of 329 pounds per acre was indicated between soils of moderately severe and very severe degrees of erosion.

UNITED STATES AGRICULTURAL ADJUSTMENT ADMINISTRATION. (1121)

AGRICULTURAL CONSERVATION 1936—A REPORT OF THE ACTIVITIES OF THE AGRICULTURAL ADJUSTMENT ADMINISTRATION. 200 pp. Washington, Govt. Print. Off. 1937.

"The report covers the activities of the Agricultural Adjustment Administration during the calendar year 1936, and reviews the shift in emphasis from emergency measures for alleviating the effect of tremendous surpluses, to long-time programs for the welfare of agriculture and especially for protecting and conserving the Nation's greatest natural resource, its soil."

UNITED STATES BUREAU OF AGRICULTURAL ENGINEERING. (1122)

REPORT OF THE CHIEF . . . 1936 24 pp. Washington, Govt. Print. Off. 1936.

Irrigation investigations include water supply forecasting, the duty of water, evaporation studies at Baldwin Park and Fullerton, Calif., silt in streams, storage of water underground, and drainage of irrigated land. Drainage investigations include run-off studies, drainage of timberlands, and durability of drain tile.

UNITED STATES CONGRESS, HOUSE COMMITTEE ON APPROPRIATIONS. (1123)

MANUFACTURE AND USE OF FERTILIZER—PREVENTION OF SOIL EROSION. Hearing . . . on second deficiency appropriation bill for 1935, 74th Cong., 1st sess., pp. 496-499, 508-509. May 28, 1935.

A. E. Morgan, chairman of the Tennessee Valley Authority Board, stated that they had made about 30,000 tons of fertilizer but had not sold any. H. A. Morgan, a director, stated that the kind of fertilizer they are making has never been made before. This fertilizer is being distributed to farmers on condition that they do not use it on plowed land—only on pasture land, because "the land that is being allotted there ought not to be plowed. We are trying to work out an economy that will stop soil erosion." Twenty farms to the county over an area of 7,000,000 acres are being used to demonstrate that waste land can be made profitable.

UNITED STATES DEPARTMENT OF AGRICULTURE. (1124)

FOREST AND RANGE RESOURCES OF UTAH: THEIR PROTECTION AND USE. U. S. Dept. Agr. Misc. Pub. 90, 101 pp., illus. 1930.

In this article on forest conservation and related subjects, the question of soil erosion is discussed under "The Protection of Watersheds," pages 88-91.

UNITED STATES DEPARTMENT OF AGRICULTURE EXTENSION SERVICE. (1125)
CONSERVATION PROGRAM IN KANSAS. U. S. Ext. Serv. Rev. 5: 164, illus.
November 1934.

Water and soil conservation program conducted by Kansas Emergency Relief Committee with the Kansas Extension Service as one of the main cooperating agencies. There are four general objectives included in the long-time phase of the program: (1) To conserve the top-soil and rainfall; (2) keep silt from filling up ponds and stream beds; (3) conserve some of the rainfall for irrigation purposes (by means of farm ponds); and (4) maintain a higher ground-water level.

FEDERAL AGENCIES FOR SOIL CONSERVATION. U. S. Ext. Serv. Rev. 5: 61. (1126)
April 1934.

Gives an outline of the Federal program for soil conservation.

SAVING SOILS AND FARM HOMES. U. S. Ext. Serv. Rev., 6: 87, 88, illus. July 1935. (1127)

Discusses the cooperation of county agents and emergency agencies in saving soils. "This work includes terracing, vegetative and tree-planting control measures, and obtaining, preparing, and distributing agricultural liming materials."

WITH ITS EAR TO THE GROUND WASHINGTON BRINGS TOGETHER ALL AGENCIES INTERESTED IN SOLVING SOIL-CONSERVATION PROBLEMS. U. S. Ext. Serv. Rev. 7: 71-72, illus. May 1936. (1128)

This article reports successful soil improvement and erosion prevention, with the use of legumes, in Spokane and Walla Walla Counties, Wash.

UNITED STATES ENGINEERING DEPARTMENT, BEACH EROSION BOARD. (1129)
BEACH EROSION AT FOLLY BEACH, S. C. U. S. Cong., 74th, 1st sess., House Doc. 156, 17 pp., illus. 1935.

Letter from the Secretary of War transmitting a letter from the Chief of Engineers, United States Army, dated April 1, 1935, submitting a report, together with accompanying papers and illustrations, on studies and investigations of beach erosion at Folly Beach, S. C., made by the Beach Erosion Board, in cooperation with the Sanitary and Drainage Commission of Charleston County, S. C., as authorized by the River and Harbor Act approved July 3, 1930.

UNITED STATES OFFICE OF EXPERIMENT STATIONS. (1130)
REPORT ON THE AGRICULTURAL EXPERIMENT STATIONS, 1936. 208 pp. Washington, Govt. Print. Office. August 1937.

Mentions sorghums as crops for severe soil-blowing conditions, p. 45, and describes erosion-control methods and equipment, pp. 170-172.

UNITED STATES SOIL CONSERVATION SERVICE. (1131)
CONTROL MEASURES MEET CHALLENGE OF HEAVY RAINS. Soil Conserv. 2: 1, 7, 14. July 1936.

Contains reports from Texas, Iowa, New Mexico, Colorado, and Kansas, with regard to success of erosion-control practices during heavy rains.

EROSION CONTROL HANDBOOK. U. S. Soil Conserv. Serv. (Mindon, La.) 57 pp., illus. 1935. [Mimeographed.] (1132)

This handbook gives instructions on how to lay out terraces and various types of check dams for gully control. Strip cropping is discussed, and various vegetative plantings are suggested.

SOIL CONSERVATION PRACTICES. U. S. Soil Conserv. Serv., Region 5, 178 pp., illus. 1936. [Mimeographed.] (1133)

"This handbook has been prepared for the use of personnel on Soil Conservation Service demonstration areas and outlying Emergency Conservation Work erosion-control camps in Missouri and Iowa. An attempt has been made to bring together in one publication the latest information available for the planning and execution of a coordinated erosion-control program."

- UNITED STATES SOIL CONSERVATION SERVICE. (1134)
SOIL EROSION CONDITIONS AND SUGGESTED CONTROL METHODS FOR THE COSHOOTON RIVER WATERSHED PROJECT. 23 pp., illus. 1935. [Mimeographed.]

Grasses and clovers, strip cropping and contour farming, tree planting and gully control are measures prescribed for the control of erosion.

- UNITED STATES SOIL EROSION SERVICE. (1135)
SOIL EROSION CONTROL AND LAND-USE PROGRAM, BANISTER RIVER PROJECT. [Chatham, Va.] 32 pp., illus. January 10, 1935.

This handbook is especially intended for the use of landowners residing in Pittsylvania County, Va. It describes Banister River soils and gives instructions on gully control, terracing practices and construction, and contour cultivation.

- UNITED STATES WAR DEPARTMENT. (1136)
LETTER FROM THE SECRETARY OF WAR TRANSMITTING . . . A LETTER FROM THE CHIEF OF ENGINEERS, UNITED STATES ARMY, DATED NOVEMBER 14, 1934, SUBMITTING A REPORT, TOGETHER WITH ACCOMPANYING PAPERS AND ILLUSTRATIONS, CONTAINING A GENERAL PLAN FOR THE IMPROVEMENT OF ALABAMA-OOOSA BRANCH OF THE MOBILE RIVER SYSTEM FOR THE PURPOSES OF NAVIGATION AND EFFICIENT DEVELOPMENT OF WATER POWER, THE CONTROL OF FLOODS, AND THE NEEDS OF IRRIGATION. 74th Cong., 1st sess., House Doc. 66, 251 pp., illus. Washington, Govt. Print. Off. 1935.

- UPTHEGROVE, DANIEL. (1137)
ROLLING CULTIVATED LANDS MUST BE TERRACED TO SAVE THE SOIL. *Executives' Mag.*, pp. 16-17, 26, illus. July 1931.

Maintains that soil riches properly conserved are inexhaustible, but cultivated soil on rolling lands without adequate protection is one of the most perishable of natural resources. The St. Louis Southwestern Railway conducts terracing schools with illustrated lectures followed by field demonstrations. Cooperation of the Federal Government, implement manufacturers, and Federal land bank at Houston, Tex., is extolled. The author contends that an acre yield is sometimes doubled by moisture conservation through terracing.

- UTAH AGRICULTURAL EXPERIMENT STATION. (1138)
BIENNIAL REPORT . . . 1934-36. *Utah Agr. Expt. Sta. Bull.* 276, 84 pp., illus. 1936.

Under the heading "Soils and Fertilizers", pages 35-45, the soil types of Washington and Carbon Counties are considered. Results of cropping and manuring systems on soil productivity are given. Flooding and furrow methods of irrigation are described, pages 52-53. "In some irrigated sections gullies have been started by allowing waste water to run in the same place for a long period of time." The use of hydromechanics in a study of the control of ground water is mentioned, page 54. Methods of dry-land farming are discussed, pages 46-54.

- UTZ, E. J. (1139)
SOME A B C'S OF SOIL CONSERVATION. *Soil Conserv.* 1: 1-3. October 1936.

The author advocates adaptable crops for various soil types and slopes classed as A, B, C, and D.

- VANDERFORN, C. F. (1140)
THE SOILS OF TENNESSEE. *Tenn. Agr. Expt. Sta. Bull.* 10 (3): 31-139, illus. 1897.

A preface to this bulletin states: "This Bulletin contains, after a description of the objects and methods of the survey, the physical and chemical analyses and climatological and botanical relations of a number of the most important typical soils of Tennessee." On page 107 the author states that nine-tenths of these gullies had their birth in cultivated fields, and might have been checked if timely attention had been given them.

- VEATCH, A. C. (1141)
GEOLOGY AND UNDERGROUND WATER RESOURCES OF NORTHERN LOUISIANA, WITH NOTES ON ADJOINING DISTRICTS. La. State Geol. Survey Bull. 4, 209 pp., illus. 1906.
"The complete report on all these areas has been published by the National Survey as Professional Paper no. 46, entitled 'Geology and Underground Water Resources of Northern Louisiana and Southern Arkansas.' Excerpts from this elaborate paper dealing with Louisiana territory form the subject matter of this bulletin. It is believed that citizens of the State will find this bulletin amply exhaustive and much more convenient for reference . . ." Erosion of the Port Hudson deposits is treated on pages 52-64.
- [WALLACE, H. A.] (1142)
METHODS OF EROSION CONTROL. U. S. Dept. Agr. Yearbook 1937: 18-22. 1937.
A general description of control methods and practices. Discusses the work of different Soil Conservation Service agencies and demonstration projects.
- OUR NATIONAL AGRICULTURAL POLICY. U. S. Dept. Agr. Yearbook 1937: 7-18. 1937. (1143)
Discusses the Federal program and policies embodied in the Soil Conservation Service Act and the relation of the individual farmer and his needs to the program.
- WALLACE, H. A. (1144)
PLAN TO BE A SOIL BUILDER. Wallaces' Farmer 55: 1638. October 18, 1930.
"Good farmers are soil builders; poor farmers are soil miners." Gives four suggestions for improving soil in the Corn Belt: manure; lime; rotation; commercial fertilizer. There follows also advice as to the kinds of clover best suited to the various soils.
- WARNER, DAVID C. (1145)
THE HYDROLOGICAL CYCLE OR THE EVOLUTION OF A DROP OF WATER. Ohio State Water Conserv. Bd., Bull. 24, 9 pp., illus. June 13, 1935.
This article discusses "... the natural evolution or developments of water through its diversified course or cycle . . ." and divides the cycle into four classes of action. A program of water conservation is proposed in which the soil-erosion phase is considered.
- WEATHERWAX, H. E. (1146)
PROTECTING NORTH CAROLINA BEACHES AGAINST WIND AND WAVE EROSION. Engin. News-Rec. 118: 330. March 4, 1937.
An abstract of a paper presented on December 14, 1936, before the American Shore and Beach Preservation Association, which describes work of the North Carolina beach erosion control project on which about 1,000 W. P. A. laborers are employed. The brush fence was found to be the most effective type for the creation of new sand dunes which could be held in place by planting protective coverings of grass.
- WEHRWEIN, G. S., AND BAKER, J. A. (1147)
RELOCATION OF NON-CONFORMING LAND USERS OF THE ZONED COUNTIES IN WISCONSIN. Jour. Land & Pub. Utility Econ. 12: 248-255. August 1936.
The land-resettlement program and the zoning accomplishments since 1933 for Wisconsin are presented. Need for dredging lake bottoms covered with silt is stressed. "These lake bottoms are for the most part surrounded by farm land. The run-off from cultivated land carries silt into streams and lakes which act as natural settling basins. Planting the shores with trees and shrubs is recommended to control erosion . . ."
- WHITCOMBE, C. D. (1148)
ON THE RECLAMATION OF LAND DEVASTATED BY THE ENCROACHMENT OF SAND. Roy. Soc. New Zeal. Trans. 5: 108-111. 1873.
The importance of reclaiming land on the west coast of New Zealand is stressed. The bars at the mouths of the rivers are principally formed of

sand driven along the coast or washed in by the sea into horseshoe shape, infinitely prejudicial to navigation. Systems adopted in France for the reclamation of sand lands are described, and plants for holding them are listed. The poplar is of special value as it will grow in exposed situations where nothing else can survive.

- WHITNEY, D. J. (1149)
VIEWING SANTA CLARA COUNTY'S AGRICULTURE. Calif. Cult. 83: 269, 311.
April 11, 1936.

Review of water conservation accomplishments and cover-crop needs and plantings in Santa Clara County, Calif.

- WHITSON, A. R. (1150)
SOIL EROSION. SOILS OF WISCONSIN. Wis. Geol. and Nat. Hist. Survey Bull. 68, Soil Series 49: 70-71, illus. 1927.

A brief discussion on gully control in southwestern Wisconsin. Recommends and describes the advantages of the porous dam and the use of vegetative cover.

- WHITSON, J. (1151)
WHAT CORN BELT FARMERS ARE DISCUSSING. Wallaces' Farmer 54: 1396.
October 18, 1929.

"Soil erosion and its control is not the same problem in the southeast one-fourth of Iowa that it is in the Missouri local soil area of western Iowa. In both of these areas, this is one of the most serious problems facing farmers as individual farm operators and as community members." The author explains that the most effective control of soil erosion in the southeastern area is through the sowing of grass after legumes have been used, whereas seeding the yellow soil to sweetclover has proved most successful for western Iowa.

- WILLIAMS, O. T. (1152)
MOISTURE MEASUREMENTS POINT WAY TO WIND EROSION CONTROL. Soil Conserv. 1: 14-15. February 1936.

Research on the erosion-control project at Dalhart, Tex. Shows that water evaporation on terraced land is less than on untterraced and that water conservation is the most important factor in control of wind erosion.

- WILSON, F. W. (1153)
NEVADA SOIL CONSERVATION PROGRAM. Pacific Rural Press 132: 198. August 29, 1936.

Suggestions made at the University of Nevada for a soil conservation program are given.

- WISCONSIN AGRICULTURAL EXPERIMENT STATION. (1154)
FINDINGS IN FARM SCIENCE FROM WISCONSIN'S PROVING GROUNDS. Wis. Agr. Expt. Sta. (Ann. Rept. 1935-36) Bull. 438, 168 pp., illus. 1937.

Factors affecting erosion measured by La Crosse station are outlined on pages 27-35. "... to keep step with this increased interest in soil conservation, machinery has been set in motion for gathering facts on which to base a sound program of soil-saving farming practices." Discusses the influence of crops, crop rotation, slopes, organic matter, character of rainfall, field operations on terraced fields, small field gullies, and the effect of grazing and forest cover.

- WISCONSIN UNIVERSITY. (1155)
THE UNIVERSITY AND CONSERVATION OF WISCONSIN WATERS. Wis. Univ. Bull., Serial 2193, General Series 1977, Sci. Inquiry Pub. 11, 79 pp., illus. 1936.

Table of contents: Surface Water Resources; Water for Human Consumption and Industrial Use; Organic Pollution of Waters; Wisconsin Lake Investigations; University Facilities for Study of Water Resources. The purposes of the bulletin are: (1) to outline the problem of water conservation; (2) to indicate the nature and variety of research needed; and (3) to show what facilities are available at the university for students of water resources.

WOLMAN, ABEL.

(1156)

DRAINAGE BASIN PROBLEMS AND PROGRAMS. Engin. News-Rec. 118: 476-479, illus. April 1, 1937.

Statement of the drainage basin report of the water resources committee, outlining its principal features, limitations, and recommendations.

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SOME RECENT FEDERAL ACTIVITIES IN THE CONSERVATION OF WATER RESOURCES. Jour. Amer. Waterworks Assoc. 28: 1252-1292. September 1936.

Report on accomplishments, purposes, and policies of the water resources committee of the National Resources Committee, presented before the annual convention of the American Waterworks Association, Los Angeles, June 9, 1936.

HOWSON, L. R., LEISEN, T. A., MORRIS, S. B., and MORSE, H. S. (1158)

REPORT OF THE COMMITTEE ON NATIONAL WATER POLICY. Jour. Amer. Waterworks Assoc. 28: 1068-1074. August 1936.

This work consists chiefly of a report on a joint conference on water planning policy held in Washington, January 22, 1936, at which time H. H. Barrows of the University of Chicago presented "A Declaration of Principles" based on the work of the Mississippi Valley committee and the former water planning committee.

WOOD, IVAN D.

(1159)

DAM THE DITCHES—STOP EROSION. Nebr. Farmer 72: 3-4, 23, 26, illus. July 12, 1930.

This article discusses soil erosion in Nebraska. The author attributes soil losses and accelerated erosion to individual negligence of landowners. The various steps in erosion control are explained and include the maintenance of soil fertility by the planting of leguminous plants, contour farming, control of small ditches, control of large gullies, vegetative cover, and terraces.

(1160)

HOW TO KEEP FARMS FROM WASHING AWAY. Lit. Digest 77: 23-24, illus. May 26, 1923.

"Millions of tons of soil particles slip silently away each year down the Mississippi to find a final resting place in the Gulf of Mexico . . . As long as rain falls on hilly ground there will be a certain amount of erosion, but there are measures which may be taken to help matters and first in importance is the upkeep of fertility." Soil-saving dams are described and illustrated.

WOODBIDGE, S. M.

(1161)

WATER CONSERVATION IN SOILS. Forester 5: 181-182. August 1899.

A brief discussion of soil porosity. The author concludes that vegetative cover is the greatest factor in the absorption and retention of moisture.

WOODBURN, R.

(1162)

EROSION CONTROL IN KENTUCKY BY CCC FORCES. Engin. News-Rec. 112: 105-107, illus. January 25, 1934.

The extensive program to save farm lands by the use of check dams built of brush, stone, and logs to prevent gullying and the value of ditches to intercept and concentrate flood flow is outlined.

ZOCH, R. T.

(1163)

A BRIEF LIST OF WORKS ON METEOROLOGY. U. S. Monthly Weather Rev. 65: 1-3. January 1937.

[ZON, RAPHAEL]

(1164)

THE IMPORTANCE OF FORESTS IN THE CIRCULATION OF WATER. Queensland Agr. Jour. 47: 223-224. February 1937.

States that Bruckner's investigations on the circulation of water in the atmosphere dealt a serious blow to the theory that the vapor from the oceans is carried by the wind to the continent, there condensed in the form of snow or rain, and later returned through rivers back to the ocean. Maintains that a dense forest contributes more vapor than any other type of vegetative cover and gives figures on amounts of vapor given off from an acre of forest.

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(See last 5 pages of this publication for 69 other lists of references pertaining to agricultural economics.)

— HANNAY, A. M., AND COLVIN, ESTHER M., COMPILERS. (1166)

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DAMS: A BIBLIOGRAPHY OF BOOKS, PERIODICALS, AND SOCIETY PUBLICATIONS APPEARING FROM JANUARY 1924 THROUGH MARCH 1936. 256 pp. Fort Belvoir, Va., The Engineer School. 1936.

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(1204)
THE LOWERING OF PLAYAS BY DEFLATION. Amer. Jour. Sci. (5) 21: 140-144, illus. February 1931.

"In a typical mountain desert basin . . . there are three distinct parts,—the rock mountain slope, the graded piedmont slope and the central playa or dry lake bed . . . It seems worth while at this time to describe the particular playa which offers the most striking indication of having been dominated by deflation." The Danby playa, in southeastern California, is the subject of discussion and the conditions found there confirm the opinion "that deflation is in fact a highly effective erosive process in deserts and one which locally exerts a powerful influence upon the features of desert landscapes."

BONNER, F. E. (1205)
CLIMATIC CYCLES IN THE WEST; NO DIRECT RELATION FOUND BETWEEN THE SUN SPOTS, TREE RINGS, AND RAINFALL. Civ. Engin. 5: 343-346, illus. June 1935.

"In studying the cycles of precipitation in the Pacific States, various data may be exploited. California records themselves extend back about 85 years. Then there are sun-spot numbers, which have been carefully recorded for

almost two centuries. To them definite value as indicators of rainfall variations are described by some investigators. Measurements of tree growth show records much farther back and so can be used to tie in all the rain indices." The author discusses all these data in an attempt to find some interdependence.

BONNEY, T. G. (1206)

WORK OF RAIN AND RIVERS. 144 pp., illus. New York, G. P. Putnam's Sons; Cambridge, University Press. 1912.

The author hopes "to do a real service to persons of ordinary education if he can indicate, in language intelligible to them, the methods of observing, the processes of reasoning, and the conclusions reached by trained students of science," with regard to the work of rain and rivers. The carving and carrying power of water, the making of valleys, and the transport and deposit of materials, are discussed, and the history of a river system is given.

BOWIE, WILLIAM. (1207)

SHAPING THE EARTH. Wash. Acad. Sci. Jour. 21: 103-125. March 19, 1931.

On pages 118-121 erosion and sedimentation are discussed. Water erosion is far greater than wind erosion. "It has been estimated that in the United States the rate of erosion is approximately 1 foot in 9,000 years . . . The water falling as rain carries off vast quantities of material in suspension and solution. It unloads certain portions of the earth's crust and overloads others."

THE SURFACES OF THE EARTH. Jour. Geol. 40 (8): 739-744. 1932. (1208)

To the pedestrian, the sailor, the mathematician, the geophysicist, and the tidal experts, respectively, the earth has a different surface. "All of these surfaces are different, yet they are not very far apart." This paper is a study of these surfaces.

BOWMAN, ISAAC. (1209)

OUR EXPANDING AND CONTRACTING "DESERT." Geogr. Rev. 25: 43-61, illus. January 1935.

"It is the purpose of this paper to examine certain climatic ideas now current, some of them rooted in experience and scientific truth, others fundamentally unsound." The retreat of the glaciers, the evidence of the lake basins, and the rainfall curve are all considered by the author, who contends that "the analysis of rainfall records, region by region, must continue at an accelerated pace, in still more variable forms, and for longer periods. Only thus can we expect to obtain a more accurate expression for the degree of risk involved in living in any part of the semiarid region that contains sub-marginal land . . . upon which settlement became overextended."

BRIGGS, L. J., and BELZ, J. O. (1210)

DRY FARMING IN RELATION TO RAINFALL AND EVAPORATION. U. S. Bur. Plant Indus. Bull. 188, 71 pp., illus. 1910.

"This bulletin contains a discussion of dry farming in relation to the amount and character of the rainfall and evaporation in the western United States." Wind and water erosion are discussed briefly, pages 15-16.

BRYAN, K. (1211)

EROSION AND SEDIMENTATION IN THE PAPAGO COUNTRY, ARIZ., WITH A SKETCH OF THE GEOLOGY. U. S. Geol. Survey Bull. 730: 19-90, illus. 1922.

"The papago country, as the term is used in this paper, is a region of about 13,000 square miles in Southwestern Arizona." The surface features of this desert region are described. "These land forms, interesting in themselves and exercising complete control over the lives of the Papagos and the movement of travelers, are the result in large part of processes peculiar to a desert region. The object of this paper is to describe these land forms and to discuss their probable mode of origin." The geologic and physiographic history is outlined. A glossary for the use of the lay reader accompanies this paper.

PEDESTAL ROCKS FORMED BY DIFFERENTIAL EROSION. U. S. Geol. Survey Bull. 790: 15 pp., illus. 1927. (1212)

This description of pedestal rocks in the States of Washington and New Mexico indicates the variety of processes involved in the formation of these

minor forms and emphasizes the "accumulating evidence" that many pedestal rocks, even in arid regions, are attributable primarily to other processes than wind erosion. Examples cited tend to show that they are due to processes which are also operative in humid regions.

- , and McCANN, F. T. (1213)
SUCCESSIVE PEDIMENTS AND TERRACES OF THE UPPER RIO PUERCO IN NEW MEXICO.
Jour. Geol. 44: 145-172, illus. 1936.

"In the area drained by the Upper Rio Puerco and its tributaries, erosion has been marked by the development of a series of successively lowered, stabilized, local base-levels whose existence is recorded by multiple pediments and terraces. The early geomorphologic history is obscure. Some indications of a hypothetical early and wide-spread erosion surface exist. There are more definite traces of a later high-level surface of coalescing pediments. The detailed history began in the Pleistocene with the dissection of this second surface and involved formation of the Upper Rio Puerco by adjustment to structure with accompanying piracy. Thereafter, the La Jara pediment was formed to a stabilized grade 180-200 feet above that of the present stream. Two minor cycles produced terraces about 30 and 10 feet high, respectively, but on rock. Finally, the inner valley of the river was cut and alternately filled and eroded in the minor epicycles characteristic of the region." The article includes geologic diagrams and photographs of the Rio Puerco Basin.

- and SCHOEWE, WALTER H. (1214)
SELENITE—A CRITERION OF EFFECTIVE WIND-SCOUR. Science 81: 233-234. March 1, 1935.

This paper gives data showing that, in the climates prevailing in most parts of the United States, the presence of selenite fragments on the surface may be indicative of the general absence of effective wind scour.

- CAIRNES, DE LORME D. (1215)
DIFFERENTIAL EROSION AND EQUIPLANATION IN PORTIONS OF YUKON AND ALASKA. Bull. Geol. Soc. Amer. 23: 333-348, illus. 1912.

"The domains of physiography and general geology encroach and overlap—but always to their mutual advantage. Nowhere has the writer found this better illustrated than in the district in which, during the past summer, he was engaged in connection with his regular field work for the Canadian Geological Survey. There in a single small area two contrasting types of topography are exhibited—one youthful, the other in a mature to old-age condition—and the differentiation is almost, if not wholly, due to the unequal powers of resistance which the dominant classes of bedrock in the district have displayed toward the various erosive activities to which they have been subjected."

- CLARKE, F. W. (1216)
PRELIMINARY STUDY OF CHEMICAL DENUDATION. Smithsn. Misc. Collect. 56: 1-19. June 1910. (Pub. 1935.)

The purpose of this paper was to attack systematically, with the evidence supplied by detailed analyses of many American rivers and of the waters east of the hundredth meridian, the problem of chemical denudation. It was written "in order to make existing data more available for discussion, and to point out the deficiencies in our knowledge. If it stimulates investigation . . . its main purpose will be fulfilled." Taking the several continents in order, the composition of their waters tributary to the ocean are estimated. "The analyses represent, in ionic form, the percentage composition of the dissolved mineral matter, and under the caption of *denudation factor* I give the number of metric tons annually removed in solution from each square mile of drainage basin."

- CLELAND, H. F. (1217)
POST TERTIARY EROSION AND WEATHERING. Amer. Jour. Sci. (5) 19: 289-296, illus. April 1930.

The geological history of the glaciated area of the Catskill Mountains is discussed.

- CLEMENTS, F. E. (1218)
 RAINFALL AND CLIMATIC CYCLES. Carnegie Inst. Yearbook 22: 318-319. 1923.
 Discusses an investigation of the rainfall of the western part of the United States and Canada in relation to the sunspot cycle of the year 1923.
- AND CHANEY, R. W. (1219)
 ENVIRONMENT AND LIFE IN THE GREAT PLAINS. Carnegie Inst. Wash. Sup. Pub. Ser. 24, 54 pp., illus. 1936.
 "During recent years the untoward effect of climate has been strikingly in evidence throughout the Great Plains and adjacent regions. The most dramatic phenomenon has been a succession of bewildering dust storms driven by the wind from soil stripped of its protecting grass cover and parched by excessive heat and drought. The failure of crops and the extensive removal of top-soil has led to the abandonment of farms on a large scale and to the belief that a great portion of the land is permanently unsuited to agriculture. Such views are the outcome of too short a perspective and hence it becomes imperative to analyze the situation in the light of changes of climate and life as revealed by the geological record . . . to survey the climatic trends of the immediate and more remote past to correlate them with the responses of plant and animal life." A general summary of the results of these studies is given.
- COLE, W. S. (1220)
 IDENTIFICATION OF EROSION SURFACES IN EASTERN AND SOUTHERN OHIO. Jour. Geol. 42: 285-294. 1934.
 "Correlation of the erosion surfaces of eastern and southern Ohio and adjacent areas in Pennsylvania and West Virginia with the recognized surfaces in eastern Pennsylvania and adjacent areas has been attempted recently by Ver Steeg, Fridley and Nolting, and Sharp. Considerable divergence of the views is expressed by these authors. This article is an attempt to present another view of the identification and correlation of these erosion surfaces in the light of information obtained by a study of projected profiles and field work."
- CONDRA, G. E. (1221)
 GEOLOGICAL PHASES OF SOIL EROSION INVESTIGATION AND CONTROL IN NEBRASKA. Nebr. Geol. Survey Paper 6, 22 pp., illus. 1934.
 Discusses erosion in general, effects of climatic change and glaciation, our relations to glaciation, effects of erosion and resulting land forms, wet and dry periods, evidence of soil depletion by erosion, and erosion prevention and control.
- CORWIN, LEONARD B. (1222)
 SAMPLING THE WEATHER AT THE OKLAHOMA CLIMATIC RESEARCH CENTER. Soil Conserv. 2: 237-238, 244, illus. April 1937.
 "The Oklahoma Climatic Research Center established by the Soil Conservation Service in cooperation with the United States Weather Bureau, has the distinction of being the most comprehensive undertaking ever attempted for the study of microclimatology and its application to the problems of soil conservation. In an area 30 by 80 miles in extent, including Blaine, Kingfisher, and Logan Counties, 200 fully equipped weather stations have been established. All weather instruments are read simultaneously and at short intervals. In this way it has been possible to trace individual storms as they cross the project area, to observe their behavior, determine their water contribution to each part and to the entire area, and to classify them according to their morphology."
- CROWE, P. R. (1223)
 THE RAINFALL REGIME OF THE WESTERN PLAINS. Geogr. Rev. 26: 463-484, illus. July 1936.
 "Precision has been given to the conception of a Plains type of rainfall." The graphical method is employed to show precipitation and temperature ratios, comparison of differential indices and significant rainfall changes, rainfall dispersion, and rainfall provinces.

CULBERTSON, GLENN.

(1224)

THE WEATHERING AND EROSION OF NORTH AND SOUTH SLOPES. Ind. Acad. Sci. Proc. 1899: 167-170, illus. 1900.

An account of measurements of the inclinations of four slopes near Hanover and Madison in southeastern Indiana. Among other considerations and conclusions the author states: "Again, the soil of the north slopes is frequently frozen, and even covered with snow or ice, while that of the south slopes is unfrozen. Hence, the erosive action of many winter rains is almost nothing on the north slopes, while it may be quite marked on the south slopes . . ."

CUTTING, H. A.

(1225)

DUST STORM IN VERMONT. Arch. Sci. 6: 81-85. February 12, 1870.

A "brown snow" storm in Vermont was found to contain dust or ashes which gave it a peculiar brown color. The author discusses the origin of such dust and compares this storm with those in other parts of the United States and of the whole world. In his summary the writer concludes that this dust in Vermont was probably meteoric. Eminent scientists support this view.

DAVIS, W. M.

(1226)

THE CYCLE OF EROSION AND THE SUMMIT LEVEL OF THE ALPS. Jour. Geol. 31(1): 1-41. 1923.

This paper is divided into three parts. Part 1 analyzes an essay by Albrecht Penck on the summit level of the Alps, entitled "Die Gipfelflur der Alpen." Part 2 discusses the "scheme of the erosion cycle," outlining three principles: (1) That the erosion of the earth's surface has been accomplished in successive intervals of time marked off by movements of upheaval; (2) that during the epochs of rest between the movements, the destructive action of the sea waves on the shore line, or of weather and streams on the entire extent of an uplifted region, may reduce it to a low and nearly featureless surface; and (3) that a systematic sequence of forms is developed during the progress of a cycle. Part 3 analyzes Penck's criticisms of earlier studies of erosion cycles.

DAVISON, C.

(1227)

ON THE CREEPING OF THE SOIL CAP THROUGH THE ACTION OF FROST. Geol. Mag. 6: 255-261, illus. 1889.

"The object of this paper is to show how the soilcap, or its upper portion, may creep down an inclined surface through the action of frost." Experiments are described and discussed.

DE LURY, JUSTIN S.

(1228)

MOVEMENTS IN THE EARTH'S CRUST. Canad. Min. Jour. 53: 161-165, illus. April 1932.

Discusses relevant facts and theories concerning the earth and its crust and gives an outline of crustal phenomena and structures which demand explanation.

DICKEN, S. N.

(1229)

KENTUCKY KARST LANDSCAPES. Jour. Geol. 63: 708-728, illus. October-November 1935.

Karsts are limestone plateaus, marked by sinks or solution depressions, interspersed with abrupt ridges and irregular protuberant rocks. The Kentucky karst lies in a broad crescent southwestward from Louisville, flanking the western coal basin. The structure, lithology, and general geologic features of the forms are described and a discussion is given of the following landscapes: (1) Initial karst landscapes which deal with three stages, smooth or gently rolling cypress plateau, deeply dissected sandstone upland, and entirely on limestone; (2) the doline karst; (3) the basin karst; and (4) streams and basins. The relation of soil erosion to the development of these forms is treated.

(1230)

A KENTUCKY SOLUTION CUESTA. Jour. Geol. 43: 539-544. July-August 1935.

"Marginal to the Western Coal Basin in Western Kentucky is a sandstone-capped cuesta, unusual in that the capping layer is less resistant, from the standpoint of normal surface erosion, than the underlying lime-

stone. Only because solution is, locally, the more important process and only when the opened fissures in the limestone have captured the surface streams can the limestone be removed more rapidly than the sandstone. Thus the cuesta is formed and maintained (with gradual migration down dip) by solution rather than normal surface erosion."

- EAKIN, H. M. (1231)
THE YUKON-KOYUKUK REGION, ALASKA. U. S. Geol. Survey Bull. 631: 76-82, illus. 1916.

Discusses the processes of solifluction, or the migration of detritus under the thrust and heave of frost action. "The character, rate, and topographic product of these processes vary with the nature of the materials affected, with the topographic situation, and with the vegetal covering, so that several distinct types of soil movement and resultant topographic forms are recognizable . . . In the region under discussion solifluction slopes are typically developed on the talus accumulations derived from the coarser granites, and altiplanation terraces in talus from the metamorphosed and highly indurated Mesozoic rocks. The study of these typical occurrences has furnished many of the data on which this discussion of solifluction is based."

- ENGLEMAN, J. E. (1232)
ECOLOGICAL RELATIONSHIPS IN THE OKLAHOMA CLIMATIC RESEARCH CENTER. Soil Conserv. 2: 235-236. April 1937.

- FENNEMAN, N. M. (1233)
PHYSIOGRAPHY OF WESTERN UNITED STATES. 534 pp., illus. New York, McGraw-Hill Book Co. 1931.

The author's central theme is the land forms of the western part of the United States and how they came about. "This book is mainly geological. It treats land forms as effects, not as causes." Chapter I deals with the Great Plains province, the High Plains of which are said to be of fluvial origin. Erosion of every kind and its effects on the topography are discussed, and the resources of the area described.

- FIELD, RICHARD M., and LAMMERS, EDWARD. (1234)
PHYSIOGRAPHIC HISTORY OF THE YELLOWSTONE PARK. Bull. Geol. Soc. Amer. 43: 133. March 1932.

"Recent investigations in the neighborhood of Junction Butte, and the length of the Lamar Valley, confirm the suggestion made by Jones and Field, in 1929, that the youngest basalt flows in the Yellowstone Park are not interbedded with the rhyolites but are post-rhyolite (Post-Miocene), and flowed upon a well dissected topography, damming and deranging the drainage. Due to the recent partial re-excavation of valleys (each originally dating from either the Oligocene, Pliocene or the subdivisions of the Pleistocene) portions of the Park present an interesting example of composite topographies, and permit a tentative correlation with the physiographic events in neighboring regions."

- FLEMING, J. A.
THE SEVENTEENTH ANNUAL MEETING OF THE AMERICAN GEOPHYSICAL UNION. Science 84: 63-66. July 17, 1936.

Reports on meeting held at Washington, D. C., April 30, May 1 and 2, 1936. Papers on recent trends in geophysical research include: The Place of Geodesy in Geophysical Research, by W. Bowie; Recent Developments in the Geophysical Study of Oceanic Basins, by R. M. Field; Trends in Seismological Research, by James B. Macelwane; Recent Progress in the Physical Interpretation of Synoptic Weather Charts, by E. W. Wollard.

- FLEMLEY, H. M. (1236)
IDENTIFICATION OF EROSION SURFACE IN SOUTH-CENTRAL NEW YORK. Jour. Geol. 37 (2): 113-134, illus. 1929.

"The plateau region of south-central New York is now dissected to the stage of early maturity. In part the topographic aspect of the region is due to the effects of the Pleistocene ice invasions. But the summits of the hills over the entire area are closely accordant in elevation (1,700-1,800 feet) and show considerable expanses of undissected flat-topped summit areas. However, the Devonian strata, of which the plateau

is built, dip uniformly (if only slightly) to the south. In consequence of these relations physiographers have been in doubt whether the flat-topped upland surface of this section is a structural plain or an uplifted, dissected peneplain. This paper presents the results of an investigation devoted to the solution of this problem."

- GAUTIER, E. F. (1237)
SAHARA, THE GREAT DESERT. 264 pp., illus. New York, Columbia Univ. Press. 1935.

After an introduction to the Great Desert, its climate, and the organization of desert life, the author treats of the physical existence of the Sahara, present and past. In a chapter entitled "Fundamental Laws of the Desert Surface Relief", among the forces involved he speaks of aeolian and fluvial erosion and warns against the belief in exaggerated influence of wind erosion. "On ground unprovided with vegetation, where the extremes of temperature splinter the surfaces of the rocks and reduce the clay substances to dust, the rare but extremely violent storms leave ravages of extraordinary erosion . . . Running water freighted with earth is necessarily a more powerful instrument of erosion than an air current . . . The forces of wind and water collaborate; . . ." In the chapter "Progressive Dessication" the cycles of desert erosion are considered. A glossary is included.

- GREGORY, J. W. (1238)
RELATIVE INFLUENCE OF DENUDATION AND EARTH MOVEMENTS IN MOULDING THE SURFACE OF THE EARTH. *Scientia* 40: 217-230, October 1926.

"That the continental masses are due to uplift and the ocean basins to subsidence has been generally recognized by those who hold that the actual surfaces are due to sculpture by the various agents which together produce denudation . . . Sir Archibald Geikie, whose views were deeply influenced by the work of the American Geologists in the Western States, remarked that 'the land owes its existence mainly to upheaval of the terrestrial crust'; but he attributed the existing surface contours mainly to erosion." Many other authorities are quoted on the subject, and the author concludes: "This brief summary indicates that not only are the major features of the earth, the continental masses and ocean basins, due to earth-movement, but that many smaller features are due to the same cause."

- GUILBERT, G. (1239)
DECLINE IN RAINFALL. *Assoc. Franc. Avanc. Sci. Compt. Rend.* 37: 412-418. 1908.

Discusses the progressive and general decline in rainfall in France, with the conclusion that this is universal. There is an order of succession in the various meteorologic periods, a dry period followed by a humid one. Ancient times are compared with the present. Legislation for the protection of forests and woodlands is advocated.

- HAFSTAD, KATHARINE C. (1240)
THE LIFE HISTORY OF RAIN STORMS. *Soil Conserv.* 2: 156-159, illus. January 1937.

A study of "climatic variations which condition local differences on soil erosion" made in Blaine, Kingfisher, and Logan Counties, Okla., since October 1935. A rainfall map is included.

- HAND, IRVING F. (1241)
CHARACTER AND MAGNITUDE OF THE DENSE DUST-CLOUD WHICH PASSED OVER WASHINGTON, D. C., MAY 11, 1934. *U. S. Monthly Weather Rev.* 62: 156-157. May 1934.

This dust cloud was noteworthy not only because observations showed a higher dust content of the atmosphere than ever measured by the Weather Bureau before, but also because of its brief duration. A note on the petrology of the storm is added.

- HAYES, M. W. (1242)
SOME GREAT FLOOD-PRODUCING STORMS OF THE ATLANTIC SEABOARD. *Bull. Amer. Met. Soc.* 18: 128-132, illus. March 1937.

HERSHEY, O. H. (1243)

OBSERVATIONS ON DIRTSTORMS. Amer. Geol. 23: 380-382. 1899.

A description of a great storm which reached Freeport, Ill., shortly after noon on February 18, 1896. Other storms of like nature are described, and the writer comments on various theories as to "black snow".

HICKS, L. E. (1244)

SOME ELEMENTS OF LAND SCULPTURE. Bull. Geol. Soc. Amer. 4: 113-146. 1893.

"This paper makes no pretensions to an exhaustive treatment of the elements of land sculpture. There are other forces at work, and the forces named operate in ways not herein discussed in detail; but in the broad, general view of the subject the face of nature is moulded chiefly by these forces: (1) Upheaval, which furnishes the structural blocks to be chiseled into pleasing forms; (2) Weathering, which rounds off the asperities and covers the land with graceful, swelling curves; (3) Washing of water, which yields concave flowing lines upon slopes of erosion, and low convex curves of deposition. The combination of the weather curve with the water curve of erosion is here noted and explained for the first time."

HILGARD, E. W. (1245)

THE RELATION OF SOILS TO CLIMATE. Calif. Agr. Expt. Sta. Rept. 1892-94: 100-139. 1894.

"Since soils are the residual product of the action of meteorological agencies upon rocks, it is obvious that there must exist a more or less intimate relation between the soils of a region and the climatic conditions that prevail or have prevailed therein. It is the object of this paper to discuss . . . some of the more important phenomena dependent upon this correlation and their effects upon the agricultural peculiarities of the chief climatic subdivisions." The processes of soil formation, classification and nature of soils, climatic conditions upon the physical character of soils, influence of aridity upon the formation of humus, and vegetation are among the studies discussed.

HOBBS, W. H. (1246)

EARTH FEATURES AND THEIR MEANING; AN INTRODUCTION TO GEOLOGY FOR THE STUDENT AND THE GENERAL READER. Ed. 2, 517 pp., illus. New York, Macmillan Co. 1931.

"The keynote of this course may be found in the dominant characteristics of the different earth features and the geological processes which have been betrayed in the shaping of them . . . The present work has . . . been prepared with a view to selecting for study those dominant geological processes which are best illustrated by features in northern North America and Europe." A full treatment of desert regions is given.

HOLWAY, R. S. (1247)

THE EFFECT OF SEVEN YEARS' EROSION ON THE CALIFORNIA FAULT LINE OF 1906. Bull. Amer. Geogr. Soc. 46, pp. 420-426, illus. June 1914.

" . . . the main effect of the seven years' erosion has been merely the softening and rounding of the sharp edges of the broken sod" on the San Andreas fault. Observations on this and on the Haywards fault are discussed.

HOLZMAN, B., AND CLARKE-HAFSTAD, K. (1248)

CHANGES IN ATMOSPHERIC CIRCULATION RESULT IN FLOODS. Soil Conserv. 2: 254-255, 266, illus. May 1937.

It is stated that "the climatic elements such as temperature and rainfall of any particular region undergo periodic daily and seasonal variations; but the unexpected aperiodic variations are brought forcefully to our attention because they often result in such national disasters as droughts and floods."

HOWE, EARNEST. (1249)

LANDSLIDES IN THE SAN JUAN MOUNTAINS, COLORADO, INCLUDING A CONSIDERATION OF THEIR CAUSES AND THEIR CLASSIFICATION. U. S. Geol. Survey Prof. Paper 67: 58 pp., illus. 1909.

"In a region whose last cycle of erosion has not yet passed beyond its youth or very early maturity, wasting of land proceeds with the utmost activity." This is a 10-year study of landslides.

- HUMPHREYS, W. J. (1250)
 WEATHER RAMBLES. 265 pp., illus. Baltimore, Williams & Wilkins Co. 1937.
 The author discusses tornadoes, frost, snow, atmospheric conditions, the falling of dew, and rainfall among other aspects of weather.

- JANSEN, J. C. (1251)
 EVAPORATION AND RAINFALL STUDIES IN THE NORTHWEST MINNESOTA LAKE REGION. Amer. Phil. Soc. Proc. 76 (5) : 747-759, illus. 1936.
 Observations made during the drought period of 1934 on the path of local thunder storms, changes in water table, rate of surface evaporation, and related data are presented.

- JOHNSON, DOUGLAS. (1252)
 AVAILABLE RELIEF AND TEXTURE OF TOPOGRAPHY; A DISCUSSION. Jour. Geol. 4: 293-305. 1933.

"Attention is directed to a recent discussion of 'available relief', or 'critical relief', and 'drainage relief'. Suggestions are made for redefining two of the terms, and the factors involved in the development of relief are examined. It is shown that the spacing of drainage lines (texture of topography) is a factor of prime importance in determining quantity of relief, and that available relief may vary greatly with the differences in stream spacing. Finally it is suggested that stages of land mass dissection should be expressed in terms of the amount of mass removed, not in terms of amount of upland surface destroyed, and it is concluded that available relief offers a useful basis for judging the progress of land mass removal."

- KERR, W. C. (1253)
 ON THE ACTION OF FROST IN ARRANGEMENT OF SUPERFICIAL EARTHY MATERIAL. Amer. Jour. Sci. (3) 21: 345-358, illus. May 1881.

In this description of superficial strata the relation of frost to gully erosion is given some consideration.

- KEYES, C. R. (1254)
 DEFLECTION AND THE RELATIVE EFFICIENCY OF EROSIONAL PROCESSES UNDER CONDITIONS OF ARIDITY. Bull. Geol. Soc. Amer. 21: 565-598. 1910.

"It is the arid region which has introduced us to an erosive agent more potent than corrasion, more constant than the working of the rains, more extensive and persistent than the encroachment of the sea. Eolian erosion, wind scour, or eolation, must ever grow in effectiveness as the history of our globe goes on and erosion lasts. It may be that in the lineaments of our moon we see the final effects of eolic powers." Other topics are peculiarities of an arid climate, rock weathering in desert regions, limitations to geologic work of water in arid regions, deflation of arid lands, and comparative effects of corrasion and deflation.

- (1255)
 EROSIONAL ORIGIN OF THE GREAT BASIN RANGES. Jour. Geol. 17 (1) : 31-37, illus. 1909.

"In the consideration of the origin of the American desert mountains, it is usually assumed that they are strictly structural features . . . Present indications are that erosion—eolian erosion—must be reckoned with as one of the potent factors in desert sculpturing." Discusses Spurr's theory of stream corrasion as the most important or only sculpturing agency and Davis's hypothesis on the origin of the Great Basin ranges.

- (1256)
 GREAT EROSIONAL WORK OF WINDS. Pop. Sci. Monthly 82: 468-477, illus. May 1913.

Discusses the theory of regional eolation. "The law of regional eolation will rank high among modern geological discoveries . . . The theory adequately explains a . . . host of perplexing phenomena concerning the larger features of earth . . . It projects the imagination backward to the beginnings of geologic history; and it carries it forward to the end of time. In the lineaments of our dead moon it may be we behold the final effect of eolic powers." Many illustrations are included.

- KINCEP, JOSEPH B. (1257)
CLIMATE OF THE GREAT PLAINS AS A FACTOR IN THEIR UTILIZATION. *Ann. Asso. Amer. Geogr.* 13: 67-80, illus. June 1923.
The author discusses various geographic factors that influence agricultural conditions, principally climate, topography, and soil fertility. "Of these, climate is the most fundamental, unalterable, and important, not only in influencing the distribution of particular crops, but also in determining the suitability of land for agricultural purposes." Moisture limitations, temperature, and climatic limitations to agriculture are discussed. "At present only about one per cent of the Plains is under irrigation . . ."
- KNOPF, E. B. (1258)
CORRELATION OF RESIDUAL EROSION SURFACES IN THE EASTERN APPALACHIAN HIGHLANDS. *Bull. Geol. Soc. Amer.* 35: 633-668, illus. 1924.
A method of drainage analysis is suggested whereby it is possible ". . . to prove the existence of successive erosion cycles and to correlate the remnants of peneplanes or of old erosion surfaces in regions that have been recently uplifted."
- KOSCHMANN, A. H., AND LOUGHLIN, G. F. (1259)
DISSECTED PEDIMENTS IN THE MAGDALENA DISTRICT, NEW MEXICO. *Bull. Geol. Soc. Amer.* 45: 462-477, illus. 1934.
A discussion of the geology and ore deposits in central New Mexico. The physiography of the section is described, and causes of pediment dissection are given.
- LA GORCE, J. C. (1260)
PIRATE RIVERS AND THEIR PRIZES. *Natl. Geogr. Mag.* 50: 86-132, illus. July 1926.
"The warfare of waterways has sometimes changed the geography of our continents . . . The forces of erosion are the munitions of the rivers' warfare; the sedimentary rocks and soil the fruits of their carnage; and landscapes the trophies of their age-long conflicts." The Delaware, Susquehanna, and Shenandoah Rivers and the valleys they have cut are described, as well as other large and small rivers of the United States.
- LANGLEY, S. P. (1261)
THE INTERNAL WORK OF WIND. *Smithson. Contrib. to Knowledge* 27 (884), 23 pp., illus. 1893.
"What immediately follows is an account of evidence of the complex nature of the 'wind', of its internal movements, of the resulting potentiality of this internal work, and of attempts which the writer has made to determine quantitatively its amount by the use of special apparatus, recording the changes which go on (so to speak) within the wind at very brief intervals. These results may, it is hoped, be of interest to meteorologists, but they are given here with special reference to their important bearing on the future of what the writer has ventured to call the science of Aërodromics." Experiments are described, and graphs illustrate the subject matter.
- LAWSON, A. C. (1262)
EPIGENE PROFILES OF THE DESERT. *Calif. Univ. Geol. Bull.* 9 (3): 23-48, illus. 1915.
Lists and describes the causes leading to the degradation of orogenic blocks in rainless regions and discusses degradation, alluviation, and truncation of epigene forms in arid regions.
- LEE, W. T. (1263)
PENEPLAINS OF THE FRONT RANGE AND ROCKY MOUNTAIN NATIONAL PARK, COLORADO. *U. S. Geol. Survey Bull.* 730: 1-17, illus. 1922.
"The purpose of this paper is to call attention to some of the major surface features in the Rocky Mountain National Park and to point out their probable correlation with similar features in neighboring regions." Discusses cycles of erosion in the Rocky Mountain National Park and the physiographic history of the Rocky Mountains.

LEIGHLY, JOHN.

(1264)

MEANDERING ARROYOS OF THE DRY SOUTHWEST. *Geog. Rev.* 26: 270-282, illus. April 1936.

"The recently cut arroyos of the Colorado Plateau . . . exemplify . . . the action of running water in sculpturing the land surface. It is from this latter viewpoint that they are brought under scrutiny in this article." Primary meandering in the drainage channels, the shape of the meanders, and the numerical characterization of their shapes are discussed with the aid of diagrams and maps.

LEITH, C. K.

(1265)

SILICIFICATION OF EROSION SURFACES. *Econ. Geol.* 20 (6): 513-523. September-October 1925.

Silicification is defined as "... the replacement of rocks by quartz, chert, chalcedony and jasperoid, the filling of joints and other openings by these minerals, and also the mechanical concentration of fragmentary masses of them by leaching of associated soluble substances, followed in some cases by siliceous recementation." The process is described on pre-Cambrian unconformities in the Lake Superior section.

MALOTT, C. A.

(1266)

BASE-LEVEL AND ITS VARIETIES. *Ind. Univ. Studies* v. 15 (Study 82), pp. 37-59. December 1928.

"Base-level is a control level in the reduction of land surfaces as carried on by the denudational processes; it serves as the theoretic limit of reduction and sculpture of the lands by the active denudational processes, chief of which is running water . . . It is the purpose of this paper to give a review of the uses of the term base-level as presented by a number of leading authorities in this country, and to present a discussion which clearly distinguishes the varieties of base-level, following the principles originally stated by Powell in 1875."

(1267)

THE VALLEY FORM AND ITS DEVELOPMENT. *Ind. Univ. Studies* v. 15 (Study 81), pp. 3-34. December 1928.

Valley characteristics, general classification of valleys, general valley development and the lengthening of valleys, the deepening and widening of valleys, the development of the flood-plain floor of valleys, and the valley form in the erosion cycle are all considered in this paper.

MARTIN, HOWARD H.

(1268)

THE RELATION OF WIND DIRECTION TO SUBSEQUENT PRECIPITATION IN CENTRAL OHIO. *U. S. Monthly Weather Rev.* 47: 730-733, illus. October 1919.

The author explains his primary purpose with tables and graphs and says in part: "... it is first necessary to establish and consider the probable frequency of precipitation in the district so that the apparent relations between the two phenomena may be reduced to the true relations."

MATTHES, FRANCOIS E.

(1269)

AN INTERLUDE OF AGGRADATION IN THE CYCLE OF EROSION OF THE GRAND CANYON OF THE COLORADO. *Ann. Assoc. Amer. Geogr.* 22: 68. March 1932.

Investigations extending over a considerable part of the Colorado River's course and much adjacent territory will probably be required for the determination of the cause of this aggradation. "Meanwhile the facts observed convey this lesson: that a cycle of erosion proceeding with sufficient vigor to produce narrow V-shaped gorges can be interrupted by an interlude of aggradation and then resume its course without the hard rock forms being sensibly affected."

MEYERHOFF, H. A., AND OLMSTEAD, E. W.

(1270)

WIND- AND WATERGAP SYSTEMS IN PENNSYLVANIA. *Amer. Jour. Sci.* (5) 31: 391-393. May 1936.

This is a reply to Ver Steeg's attack on the mathematical analysis of wind gaps and water gaps as presented by the authors in *Windgaps and Watergaps in Pennsylvania* *Amer. Jour. Sci.* (5) 30: 98-105, 1935. Defends "grouping them into systems which may have some genetic relationship to cyclical erosion, and which, at the same time, may contribute support to the cyclical interpretation of Appalachian erosional history."

MOYER, RAYMOND T.

(1271)

THE ARIDITY OF NORTH CHINA. Jour. North Branch Roy. Asiatic Soc. 63: 65-80, illus. 1932.

Examines the theory of increasing aridity in Shensi and Kansu Provinces and presents data which lead to tentative conclusions "... pending the contribution of further information which will give a more accurate picture of what the conditions have been, or a truer interpretation of what may be the climatic trends they represent." Discusses forest destruction, sand encroachment, and excessive run-off resulting from slope denudation as possible causes and gives data on the findings of Lowdermilk. Bibliography, pp. 79-80.

NELSON, A. L.

(1272)

EROSION OF SOIL PROBLEM THAT REQUIRES BEST JUDGMENT IN VIEW OF CIRCUMSTANCES. Wyo. Stockman-Farmer 42: 1, 15, illus. March 1936.

The author stresses the importance of climatic and soil studies in the erosion-control plan.

NEVIN, CHARLES M.

(1273)

PRINCIPLES OF STRUCTURAL GEOLOGY. 348 pp., illus. New York, John Wiley & Sons. 1936.

"The purpose of this text is to discuss, as simply as possible, the deformations of the earth. Matters now in dispute among geologists are not avoided ... References have been selected so as to present different viewpoints, with the hope that the reader will exercise his own judgment, rather than follow blindly the interpretation and emphasis given in the text." Physical properties of rocks, structures associated with igneous intrusion, structures in unconsolidated sediments, and mountain systems are among the subjects considered.

OLSON, LOIS.

(1274)

MIGRATION AND ECONOMIC OPPORTUNITY IN THE GREAT PLAINS. Geogr. Rev. 26: 670-672. October 1936.

The writer comments on conditions existing in the Great Plains due to climate and mentions field studies in climate begun by the Soil Conservation Service, which permits the accumulation of more detailed weather data than has before been possible.

PAIGE, SIDNEY.

(1275)

ROCK SURFACES ON THE DESERT RANGES. Jour. Geol. 20 (5): 442-450, illus. 1912.

Outlines considerations which suggest the following tentative conclusions: (1) Processes of erosion within an inclosed basin system in an arid climate tend ultimately to produce surfaces of very low relief about the borders of the gravel sheet which accumulate within the basin; (2) the gradual rising of the gravel filling implies an equally gradual rising of the local base level; (3) interstream erosion, lateral cutting at edges of accumulating fans, and progressive burial of low-lying areas are the factors which govern the formation of the rock-cut surface; and (4) sheet-flood erosion is considered a result of the rock-cut plains and not a cause.

PARKINSON, G. R.

(1276)

DUST STORMS OVER THE GREAT PLAINS: THEIR CAUSES AND FORECASTING. Bull. Amer. Met. Soc. 17: 127-135, illus. May 1936.

Results of studies as to sources of dust storms in the Middle West and the Southwest are presented. Precipitation deficiency over the western plains States is caused by polar continental air masses taking a track farther east than usual for several years prior to May 1935. The characteristic properties of air masses causing dust storms are described, and the author states that, in order to forecast dust storms, it is necessary to determine what air mass will prevail over the route for the time for which the forecast is desired, the characteristic properties of the air mass involved, frontal movements, wind velocities, vertical temperature gradient, previous precipitation in the location of the source region, and the time of day for which the forecast is desired.

- PENCK, ALBRECHT. (1277)
CLIMATIC FEATURES IN THE LAND SURFACE. *Amer. Jour. Sci.* (4) 19: 165-174.
February 1905.

A study is made of slopes and their causes, together with river action in relation to land surface. "This study of erosional forms can be supplemented by that of corresponding deposits . . . Thus the study of deposits also reveals forms of the past, and if we are accustomed to interpret the meaning of forms and deposits, we can read far older climatic conditions in deposits than are exhibited in the existing surface features of the land."

- REED, T. E. (1278)
METEOROLOGICAL NOTES AND ASPECTS ON THE JULY 1935 AND THE MARCH 1936 FLOODS IN THE UPPER SUSQUEHANNA WATERSHED. *Bull. Amer. Met. Soc.* 17: 357-359. December 1936.

Author's abstract of paper read at the Rochester meeting of the American Meteorological Society, 1936.

- REEDS, C. A. (1279)
THE EARTH, OUR EVER-CHANGING PLANET. 120 pp., illus. New York, Univ. Soc. 1931.

Chapter IV deals with the atmosphere and the atmospheric agencies which affect the land, the work of the wind in carrying and depositing loess and sand, and weathering. "All of the changes which cause rocks to break up are known as weathering. Much of the soil and mantle rock which support the earth's cover of vegetation has been produced by these processes of rock decay."

- REINECKE, LEOPOLD. (1280)
AVERAGE REGIONAL SLOPE, A CRITERION FOR THE SUBDIVISION OF OLD EROSION SURFACES. *Jour. Geol.* 24: 27-46, illus. January-February 1916.

"The primary object of this paper is to point out the importance of the measurement of average regional slopes upon 'old erosion surfaces', and to show that such data assist materially in the more accurate study of the physiographic development of the region in which these surfaces occur, and of the diastrophic movements which have taken place there."

- RICH, J. L. (1281)
OLD EROSION SURFACE IN IDAHO: IS IT EOCENE? *Econ. Geol.* 13 (2): 120-136, 486-492, illus. 1918.

Examines evidence that not only fails to prove that the peneplain is Eocene but also brings out many features which point toward the conclusion that the date of the peneplain is probably late Miocene or Pliocene. A discussion is given in which Waldemar Lindgren states that the burden of proof regarding the Miocene age of the peneplain still rests on Rich. D. C. Livingston takes a similar view.

- SOIL MOTTLEDINGS AND MOUNDS IN NORTHEASTERN TEXAS AS SEEN FROM THE AIR. (1282)
Geogr. Rev. 24: 576-583, illus. October 1934.

On a flight from Dallas, Tex., to Texarkana, Ark., the writer secured a photographic record of various features of mound development "which is interesting not only as a contribution to the problem itself but also as a demonstration of what can be done by way of recording geographical features from a regular passenger plane." He discusses earlier explanations of the mounds, and his conclusions after the flight.

- RUBEY, W. W. (1283)
GULLIES IN THE GREAT PLAINS FORMED BY SINKING OF THE GROUND. *Amer. Jour. Sci.* (5) 15: 417-422. 1928.

This article discusses the origin and nature of the flat-floored scarp-bordered valleys common in various sections of the arid and semiarid western interior of North America.

- RUSSELL, E. J. (1284)
THE EFFECT OF CLIMATE AND WEATHER ON THE SOIL. *Jour. Roy. Agr. Soc.* 74: 1-21, illus. 1913.

This article describes the effects of climate on the mineral framework of the soil and discusses soil losses, injury to the soil texture, etc.

- RUSSELL, I. C. (1285)
TOPOGRAPHIC FEATURES DUE TO LANDSLIDES. *Pop. Sci. Monthly* 53: 480-489, illus. August 1898.

"Perhaps the most interesting fact brought out by the study of landslide topography is that certain broad, nearly level areas, now covered with deep, rich soil . . . owe the minor features of their relief to ancient landslides . . . A review of the facts concerning the minor features in the relief of the broad wheat lands of southeastern Washington, in the light of the conclusions here presented, leads to the suggestion that some of the ridges and basins of that region may be due to the recession of cliffs produced by stream erosion . . ."

- RUSSELL, R. J. (1286)
ALPINE LAND FORMS OF WESTERN UNITED STATES. *Geol. Soc. Amer. Bull.* 44: 927-949, illus. 1933.

"It is the purpose of this paper to describe some of the more common alpine land forms and to emphasize the importance of certain significant processes. It is written in the light of field experience extending through the past 12 years and covering many of the highest regions in western United States, chiefly in California, Nevada, Colorado, and Wyoming. Field work in northeastern California in the summers between 1920 and 1925 served to arouse interest in alpine problems and led directly to practically every conclusion here presented." Deals with climatic factors controlling denudation and erosion; geomorphic processes; groups of land forms including nivation depressions and solifluction slopes; prevalence of alpine processes; over emphasis on glaciation; and possible misinterpretations.

- (1287)
CLIMATES OF CALIFORNIA. *Univ. Calif. Pubs. in Geogr.* 2 (4): 73-84, illus. 1926.

"In this paper the attempt is made to give as full an areal analysis of California climates as present data warrant, expressing the facts of distribution strictly in accordance with a well recognized, widely accepted, quantitative plan, heretofore used principally in a world-wide classification of climates. The classification followed, and to some extent adapted, is that of Wladimir Köppen which has acquired wider acceptance than any other. Examination of the climatologic data at hand indicated that somewhat more detail was desirable than was provided by Köppen for this section . . . Accordingly, a few minor changes have been made in the critical values used, and four new subtypes have been introduced."

- (1288)
CLIMATIC YEARS. *Geogr. Rev.* 24: 92-103, illus. January 1934.

"The climatic-year concept furnishes a simple and apparently satisfactory means for the determination of climatic boundary zones. We may recognize as transitional any region that normally experiences a recurrence of climatic years typical of nuclear climates on either side. Thus the transitional zone between rain forest and savana is the region ordinarily experiencing both rain-forest and savana years. The nuclear rain forest, on one side, is characterized by an unbroken succession of rain-forest years, while, on the other side, only savana years occur." The adaptability of the climatic-year concept to climatological research is fully discussed.

- (1289)
THE DESERT-RAINFALL FACTOR IN DENUDATION. *Internatl. Geol. Cong. Rept.* 16: 753-763, illus. 1933.

Presents data leading to the following conclusions: "The rainfall of the southwestern deserts is not impressively torrential, is probably less spotty in distribution than that of humid regions, and, in the factor probably most significant to denudation—the excess over average annual—is not particularly variable. The summer-afternoon cloudburst is not a very effective factor in denudation. This conclusion is confirmed by discharges of streams where little or no diversion or water storage affects the regimen."

RUSSELL, R. J.

(1290)

DRY CLIMATES OF THE UNITED STATES, II. FREQUENCY OF DRY AND DESERT YEARS 1901-20. Calif. Univ. Pubs., Geogr. 5 (5): 245-274, illus. 1932.

This study, representing, in effect, an experiment along the line of a new application of the Köppen classification of climate and treating of two types of years (dry years, defined on the same basis as dry climates, and desert years, defined on the same basis as desert climates) presents, in numerical and cartographic form, data on their frequency. A description is given of frequency maps and their construction. Regional contrasts in dry- and desert-year frequency, and the significance of dry and desert years are discussed.

(1291)

GEOMORPHOLOGICAL EVIDENCE OF A CLIMATIC BOUNDARY. Science 74: 484-485. November 13, 1931.

The author, to support the adoption of the January isotherm of 32° F. in the United States, describes erosion and denudation factors on northward and southward slopes in New Jersey and Ohio and shows why erosion is more marked on the north banks of rivers flowing east or west.

(1292)

LAND FORMS OF SAN GORGONIO PASS, SOUTHERN CALIFORNIA. Calif. Univ. Pubs., Geogr. 6 (2): 23-121, illus. 1932.

This paper, dealing with the distribution and explanation of land forms in the San Gorgonio Pass, and resulting chiefly from field work during the summer of 1930, describes the topography, drainage, and climate of the region and considers marginal areas of the San Jacinto wall, foothills of the San Bernardino Range, the Beaumont Plain, and the San Gorgonio Pass floor.

(1293)

LANDSLIDE LAKES OF THE NORTHWESTERN GREAT BASIN. Calif. Univ. Pubs., Geogr. 2: 231-254, illus. May 12, 1927.

"Landslides play a significant and major role in the formation of lakes in at least one part of North America, namely, the northwestern Great Basin." Geologic and erosional processes in several lakes in the Warner Range of northeastern California are described. Extinct lakes in the same section are also considered.

— AND HOWE, H. V.

(1294)

CHENIERS OF SOUTHWESTERN LOUISIANA. Geogr. Rev. 25: 449-461, illus. July 1935.

Cheniers are long, narrow, sandy ridges running roughly parallel to the coast of southwestern Louisiana. Their development is related to the same geologic processes which have produced Cameron Beach and Cameron Marsh. It is the purpose of this paper to describe their origin, "... a history involving several of the dominant geologic processes affecting the Gulf Coast during Quaternary time." Data are given on sedimentation and erosion.

— AND OTHERS

(1295)

LOWER MISSISSIPPI RIVER DELTA, REPORTS ON THE GEOLOGY OF PLAQUEMINES AND ST. BERNARD PARISHES. La. Dept. Conserv. Geol. Survey Bull. 8, 454 pp., illus. 1936.

"Plaquemines and St. Bernard Parishes together form the easternmost coastline of Louisiana, the portion most intimately associated with the recent alluviation of the Mississippi River. This bulletin consists of seven individual reports concerning the geology, natural resources, and prehistoric inhabitants of the Lower Delta, a term here employed to refer to the combined areas of the two parishes. It also contains a bibliography and list of maps which, while primarily compiled for the purposes of the study, is of interest as covering coastal southeast Louisiana in general."—Editor.

SANDERS, E. M.

(1296)

THE CYCLE OF EROSION IN A KARST REGION (AFTER CVIJCIC). Geogr. Rev. 11: 593-604, illus. 1921.

"In 1918 Professor CviJCic, ... published a resume of former theories on the development of subterranean drainage, supplementing them by the

results of his own work and by an ordered description of the successive changes that take place in the progress of the karst cycle. . . . The object of the present article is to present Professor Cvijic's summing up of the whole matter, amplifying it with definitions of the terms used, and giving, where it is possible, the terms used by others for the same forms."

- SCHAFMAYER, A. J., AND GRANT, B. E. (1297)
RAINFALL INTENSITIES AND FREQUENCIES. Amer. Soc. Civ. Engin. Proc. 63: 225-249, illus. February 1937.

An investigation of the relation of frequency to rainfall intensity by the statistical method forms the basis of this paper.

- SCHROEDER, R. A. (1298)
CURIOUS EROSION IN WEST TENNESSEE CLAYS. Jour. Geol. 27: 480-481, illus. September-October 1919.

An account of miniature erosion pillars in clay observed by the writer in western Tennessee.

- SHALER, N. S. (1299)
SEA AND LAND. Scribner's Mag. 11: 611-627. May 1892.

The destruction of land by sea is considered. The writer states that "all the water of rain-drop, stream, or spring, is sent from the sea through the air for the direct downward attack on the emerged fields of the earth, so that the battle the oceans unendingly wage is so set that it assaults the opposite land in two directions: on the sea face it assails by the surges, and in the interior by the rain, the flowing water, and the glaciers. The result is that lands are constantly wearing away, while the sea-floor is taking the sediments which the waters have given to it and building them into new deposits. * * *

. . . every rain drop as it falls and strikes ground unprotected by vegetation takes away a little of the earth." The action of tides and waves on shore lines and cliffs is discussed from a geological point of view.

- SHARP, HENRY S. (1300)
A LANDSLIDE SCAR IN THE CENTENNIAL VALLEY, WYOMING. Amer. Jour. Sci. (5) 21: 453-457, illus. May 1931.

A large landslide involving Tertiary sediments overlying pre-Cambrian crystallines is described. By means of the forest cover an effort is made to ascertain the time of occurrence of the landslide, which is assigned to movement along the Tertiary-pre-Cambrian contact.

- SHARPE, C. F. S. (1301)
LANDSLIDES AND RELATED PHENOMENA. (Abstract) Geol. Soc. Amer. Proc. 1935: 103-104. 1936.

Four major divisions of landslides are discussed: (1) Slow flowage, (2) rapid flowage, (3) sliding (landslide proper), and (4) subsidence.

- SHREVE, FORREST. (1302)
RAINFALL, RUNOFF AND SOIL MOISTURE UNDER DESERT CONDITIONS. Ann. Assoc. Amer. Geogr. 24, 156 pp., illus. September 1934.

"Under arid conditions the character and seasonal distribution of the precipitation is more important than under moist ones, both with reference to its agency in remodeling the land surface and its role in supplying water for plant and animal life. The influence of rainfall on physiographic processes is direct and immediate, but its relation to the vegetation is through the medium of the soil and is therefore subject to a number of modifying circumstances. The study and interpretation of these involves all of the conditions that influence the fate of water from the time that it falls until it becomes available to the roots of the plant. The following pages embody the results of an investigation of some of the influences operative in a desert of the less pronounced type. The digest of rainfall conditions is based on the record of the Desert Laboratory of the Carnegie Institution of Washington, at Tucson, Arizona, from 1905 to 1933. The investigation of runoff and soil moisture has been made on the part of the grounds of the Desert Laboratory which lies in the floodplain of the Santa Cruz River, and on the adjacent bajada soil."

- SHUTT, F. T., AND BURWASH, A. H. (1303)
 NOTES ON THE NATURE OF BURN-OUTS. Roy. Soc. Canada Proc. and Trans. (3) 15 (sec. 3): 65-68, illus. 1921.
 "The prairie surface of certain areas in the Western provinces, and more particularly in Southern Alberta and South-Western Saskatchewan, is characterized by irregular but roughly circular depressions or eroded spots varying from 3 to 6 inches in depth and from a few inches to several or many feet in diameter. These depressions, pockets or eroded spots are commonly known as 'burn-outs.'" This paper reports the results of an investigation on the nature of burn-outs conducted at the Government Demonstration Farm, Brooks, Alberta.
- AND MACOUN, J. M. (1304)
 ON THE NATURE OF BURN-OUTS. Roy. Soc. Canada Proc. and Trans. (3) 17 (sec. 3): 79-82, illus. 1923.
 Reports the findings of a study on the nature of "burn-outs." "The results . . . established the fact that a burn-out is an area from which the surface soil has been removed. Probably the first operation in its formation was burning or a mechanical loosening followed by the blowing-out of the surface soil by the wind. It is in fact the subsoil which is exposed at the bottom of a burn-out."
- SINGH, J. (1305)
 EROSION IN KANAWAR, UPPER SUTLEJ VALLEY. Indian Forester 60: 410-415, illus. June 1934.
 "As erosion is intimately connected with the physical and the climatic feature of a locality, a concise description of the tract and its climate therefore precedes the narration of the causes of erosion." The factors chiefly responsible for erosion are cited, and remedial measures are suggested.
- SONDEREGGER, A. L. (1306)
 MODIFYING THE PHYSIOGRAPHICAL BALANCE BY CONSERVATION MEASURES. Amer. Soc. Civ. Engin. Trans. 100: 284-346. 1935. [With discussion by H. H. Chapman, E. B. Debler, Frank E. Bonner, C. S. Jarvis, W. P. Rowe, J. C. Stevens, G. H. Matthes, J. B. Lippincott, R. E. Rule, and A. L. Sonderegger.]
 Illustrates the theory of a physiographical balance produced by precipitation, erosion, and debris transportation and deposition by streams, by showing the effect on such a balance of (1) changes in the watershed cover, (2) effect of regulation on the natural balance of a stream system, and (3) effect of debris barriers on the stability of the stream bed on the debris cone. Bonner, in his discussion, gives the average rate of silt production in the United States as equal to 1 inch in 400 years.
- STAHL-SCHRÖDER, M. (1307)
 THE ACTION OF THE WIND ON THE SOIL. Selsk. Khoz. i Kyesov. 196 (1900): 363-378. 1900.
 "The author discusses the influence of winds on the moisture, temperature, and gas content of the soil; on chemical composition; and as a geological agent."—Expt. Sta. Rec. 12: 526. 1900-1.
- TABER, STEPHEN. (1308)
 FROST HEAVING. Jour. Geol. 37: 423-461, illus. 1929.
 "This paper describes a laboratory investigation of problems connected with frost heaving. The principles developed have applications in geology, plant physiology, and engineering."
- TANDY, E. A. (1309)
 THE CIRCULATION OF THE EARTH'S CRUST. Geogr. Jour. 57: 354-376. May 1921.
 Describes the origin of crustal movements connected with the theory of isostasy. Deeps and rivers, alluvial plains, and river deltas are considered.
- THONE, FRANK. (1310)
 STONES INTO BREAD. Sci. News Letter 31: 110. February 13, 1937.
 "Erosion is the natural complex of effects of wind and water, frost and summer heat, upthrust and gravity, on the massed lavas and jagged rocks

that were the earth's only original endowment . . . If there had been no erosion since the beginning of the world, there would be no soil for forests and crops to grow in . . . Through erosion, stones become bread."

(1311)

THORNTHWAITE, C. W.

THE CLIMATES OF NORTH AMERICA ACCORDING TO A NEW CLASSIFICATION. Geogr. Rev. 21: 63-655, illus. 1931.

After commenting on the classification of world climates developed on a quantitative basis by Wladimir Köppen, the writer states that "in the present study a method has been devised whereby the precipitation-evaporation quotient can be computed where only the mean monthly temperature and monthly precipitation are given." In conclusion he says: "It is hoped that soil science and ecology may find in this classification a common ground which may bring them together and which can be used in the explanation of climatic formations and mature soils . . . It is believed that the climatic elements of the landscape are here analyzed with a greater precision than has heretofore been attained."

(1312)

THE CLIMATES OF THE EARTH. Geogr. Rev. 23: 433-440, illus. July 1933.

Köppen was the first to apply to the entire earth a climatic classification based mainly on quantitative analyses of meteorological data. He recognized that the critical limits in the distribution of various types of vegetation were climatic and attempted to discover empirically climatic values that would at least approximately coincide with the various vegetational limits . . . The present classification is like Köppen's in that it is quantitative and attempts to determine the critical limits significant to the distribution of vegetation and also in that it employs a symbolic enclosure in designating the climatic types. It differs from Köppen's classification in that it makes use of two new climatic concepts, precipitation effectiveness, and temperature efficiency."

(1313)

THE LIFE HISTORY OF RAINSTORMS. PROGRESS REPORT FROM THE OKLAHOMA CLIMATIC RESEARCH CENTER. Geogr. Rev. 27: 92-111, illus. January 1937.

Data and conclusions derived by the Soil Conservation Service from observations in Oklahoma are offered. The conclusion states that "we believe . . . sufficient material has been presented to show the value of . . . detailed climatic observations over a long period of years . . ."

(1314)

MICROCLIMATIC STUDIES IN OKLAHOMA AND OHIO. Science 86: 100-101. July 30, 1937.

Detailed studies of rainstorms by the Soil Conservation Service have brought recognition of two distinctive forms. "One type, of comparatively short duration and high intensities (the cold front type), is especially significant in the production of gully and sheet erosion and occasional local floods. The other type of longer duration and lower intensities, but ordinarily bringing larger amounts of rainfall (the warm front type), is significant in stimulating mass or gravity movements of soil, such as slumping, field slides and caving of gully walls and heads, and is invariably the cause of major floods." Such studies are making it "possible to approach the climatic problems relating to soil and moisture conservation, land use and flood control on a more intelligent basis."

(1315)

THE RESEARCH PROGRAM OF THE SECTION OF CLIMATIC AND PHYSIOGRAPHIC RESEARCH. Soil Conserv. 2: 218-220. April 1937.

"Agricultural research is of three types: (1) experimental, (2) observational field and laboratory investigations, and (3) library and archive study. Although controlled experimentation is the most familiar type of methodology to agricultural research workers, the other types have contributed fundamental advances to agricultural knowledge." This program is discussed under four headings: Erosion History, Physiography, Climate, and Ecology.

TOLMAN, C. F.

EROSION AND DEPOSITION IN THE SOUTHERN ARIZONA BOLSON REGION. Jour. Geol. 17: 136-163. February-March 1909. (1316)

Outline of paper: Physiographic division of bolson country; discussion of the term "bolson" into plateau and of the bolson; analysis of geological agencies and topographical features climate; deposits of the bolson; climate as affecting the stimulus of aridity; bajada. "The data to which this treatment owes its development have been collected during a residence in the arid southwest since 1901."

UMPLEBY, J. B.

AN OLD EROSION SURFACE IN IDAHO: ITS AGE AND VALUE AS A DATUM PLANE. Jour. Geol. 20 (2): 139-147, illus. 1912. (1317)

"The principal problems discussed in this paper fall under the following: (1) an old erosion surface which may provide four headings, plain . . . extends over much of Idaho and into adjoining parts of Montana, Washington, and British Columbia. (2) The surface is of Miocene age because of the relation of Miocene lake beds to it assigned to of its relation to Eocene deposits. (3) The Eocene surface is of value because of its relation to Eocene deposits. (4) Great granitic batholiths of the plateau region either initiated or accompanied the initiation of the cycle of erosion which resulted in the Eocene surface."

UNITED STATES WEATHER BUREAU.

ATMOSPHERIC INFLUENCES CAUSING MOVEMENTS OF THE SOIL. U. S. Monthly Weather Rev. 36 (13): 436 [Summary] 1908. (1318)

Records made by seismographs are described.

VAN TUYL, F. M., AND LOVERING, T. S.

PHYSIOGRAPHIC DEVELOPMENT OF THE FRONT RANGE. Bull. Geol. Soc. Amer. 46: 1291-1349, illus. September 1935. (1319)

Contents: Description and Correlation of the Tertiary Erosion Surfaces; Modifying Effects of Alpine Glaciation; Quaternary Terraces; Defacement of Erosion Surfaces; Age Relations.

VER STEEG, KARL.

EROSION SURFACES IN EASTERN OHIO. Bull. Geol. Soc. Amer. 42: 324. March 31, 1931. (1320)

"The writer recognizes the existence of three distinct erosive surfaces in the northern Appalachians and Allegheny Plateau region; the Schooley (Kittatinny) on the ridge crests of the folded Appalachians; the Harrisburg on the weaker rock formations in the valleys of eastern Pennsylvania and coextensive with the upland erosion surface leveling the Allegheny Plateau region; and a third, the Worthington (Lexington) erosion level, well developed in Ohio and Kentucky . . . This seems to the writer to be the most logical interpretation in the light of present knowledge concerning Appalachian erosion surfaces."

EROSION SURFACES OF APPALACHIAN PLATEAU. Pan Amer. Geol. 58: 31-44, illus. August 1932. (1321)

"It has always seemed unreasonable that a surface so well-developed as the Harrisburg peneplane, in eastern Pennsylvania, has, according to some geologists, no equivalent on the Appalachian plateau. In eastern Pennsylvania it constitutes the extensive, peneplaned surface on the softer rocks in the Ridge and Valley province and in the Great valley, east of Kittatinny mountain, where it is well-developed in the vicinity of Harrisburg, Pennsylvania, at an altitude averaging about 520 feet above sea-level. The purpose of this article is to trace the two peneplanes in a southwesterly direction from central Pennsylvania throughout the Appalachian Plateau region."

WARPING OF APPALACHIAN PENEPLAINS. Jour. Geol. 39: 386-392, illus. May-June 1931. (1322)

"Because the Harrisburg peneplain has a pronounced slope toward the southeast, it has been believed that widespread warping of that surface took

place in the uplifting of the Appalachians. There is reason to doubt this proposed warping, for evidence of it appears to be lacking in eastern Pennsylvania where the surface has its best development."

(1323)

WINDGAPS AND EROSION SURFACES. *Amer. Jour. Sci.* (5) 26: 507-511. November 1933.

Discusses the paper, "Erosion Surfaces in South-Central Pennsylvania", published in *Amer. Jour. Sci.* 5 (25): 101-122, February 1933, by Wm. O. Hickok, supporting the hypothesis that windgaps are indicators of erosion surfaces.

VISHNER, S. S.

(1324)

THE BIOGRAPHY OF THE NORTHERN GREAT PLAINS. *Geogr. Rev.* 11 (2): 89-115, illus. 1916.

This study on the geographical distribution of vegetation and wildlife in the Dakotas gives a brief discussion, pages 107-108, on the nature of sand-hill areas and badlands.

(1325)

REGIONAL CONTRASTS IN EROSION IN INDIANA, WITH ESPECIAL ATTENTION TO THE CLIMATIC FACTOR IN CAUSATION. *Bull. Geol. Soc. Amer.* 48: 897-929. July 1, 1937.

Three types of erosion are extensive—sheet erosion, gullying, and wind erosion. "The problem: How great are erosional contrasts in Indiana; what influences have produced them? The Method: An analysis of the soil erosion map recently issued by the United States Soil Conservation Service has been made; field observations have been made in all the counties of the State, in order to add supplementary data; maps showing the distribution of several factors presumably contributing to the causation of the contrasts were prepared and compared in detail with the erosion maps. Conclusions: Despite moderate differences with respect to elevation, relief, lithology, structure, geologic history, and climate, Indiana has notable regional contrasts in soil erosion. Factors causing these include contrasts in local relief, soil types, recency of glaciation, climate and land use. Climatic contrasts clearly have played a larger part than has hitherto been appreciated. Regional contrasts in rainfall intensity—a factor hitherto almost ignored, because evidence as to its existence had not been compiled—appears to be of considerable significance in causing part of the observed erosional contrasts."

(1326)

REGIONAL CONTRASTS IN RAINFALL INTENSITY IN INDIANA WITH SOME CONSEQUENCES OF THE CONTRASTS. *Ann. Assoc. Amer. Geogr.* 27: 121-122. June 1937.

"Apparently correlated with the regional contrasts in rainfall distribution and intensity are notable contrasts in the type and extent of soil erosion, in topography, in crop yields, in agricultural practices, and in land use of other sorts, and in other respects."

WALLACE, A. R.

(1327)

ISLAND LIFE, OR, THE PHENOMENA AND CAUSES OF INSULAR FAUNAS AND FLORAS, INCLUDING A REVISION AND ATTEMPTED SOLUTION OF THE PROBLEM OF GEOLOGICAL CLIMATES. 526 pp., illus. New York, Macmillan & Co. 1880.

Among other studies the author considers the true nature of geological change as affecting continents and islands; changes of climate, their nature, causes, and effects; and the duration of geological time and the rate of organic development.

WATSON, E. B.

(1328)

CLAY BOULDERS AND THE ROLLING ACTION OF WATER. *Soil Sci.* 3: 513-514. June 1917.

Account of an unusual display of clay boulders on the upper part of the large Hueneme fan in Ventura County, Calif. These boulders were 3 to 15 inches in diameter, and the writer states that they were rolled into place by running water and were never in suspension. "The distinction between the carrying and the rolling properties of running water has been too little recognized by those who study the forces that make soils."

WENTWORTH, C. K.

PRINCIPLES OF STREAM EROSION IN HAWAII. Jour. Geol. 36: 385-410, illus. (1929)
1928.

"The steep-walled, blunt-headed box canyons and the imposing cliffs or 'palis' of various parts of the Hawaiian Islands have long attracted the attention of travelers, and some instances faulting or other tectonic factors have been invoked to explain them. It is concluded that these features are mainly the product of the normal erosional processes of the region, of which the conditions differ somewhat markedly from those of most temperate, humid parts of the earth. The principal factors are the high porosity of the rock and its susceptibility to chemical weathering, the high mean annual temperature and the rarity of great ranges of temperature, the absence of frost and the high annual rainfall of certain parts of the group. As a result, chemical weathering at elevations near the low water table dominates the development of the deeper valleys and is a controlling factor in determining their configuration."

WEXLER, H.

A NOTE ON DUST IN THE ATMOSPHERE. Bull. Amer. Met. Soc. 17: 303-305. (1930)
October 1930.

"If measurements of the radiation intensity can be taken in certain narrow spectral regions, then it is possible . . . to determine both the dust and water-vapor contents. If a sufficient number of stations taking such measurements could be established along the main trajectories of air masses in this country, then it would be possible to determine how rapidly the air acquires dust and water vapor; and consequently to estimate the rate of evaporation of water vapor from the earth and the rate of wind erosion of the soil."

WILCOX, E. V.

DROUGHTS AND FLOODS. Country Gent. 104: 16-17, 54, illus. August 1934. (1931)

The behavior of waves and cycles of weather are discussed. Floods, grasshopper plagues, as related to weather and sunspot cycles, are considered with statements quoted from scientists.

WILLIAMS, E. H., JR.

ALLEGHANY VALLEY EROSION. Science 37: 447-450. March 1913. (1932)

"The problem for discussion is the probable form and sequence of deposits over a region deeply flooded by an approaching but still distant glacier which forced the waters over a still more distant cop which was gradually degraded." The writer develops and discusses this problem in order to disprove the assertions made by a critic of G. F. Wright's paper on Post-glacial Erosion and Oxidation and to prove that "the bottom was leveled proglacially and that there has been no 'erosion.'"

WORK, P. MURRAY.

CYCLES OF EROSION IN THE CENTRAL BLACK HILLS. Iowa Acad. Sci. Proc. (1934) 41: 209-213. 1935. (1933)

"In order that the reader may have a clearer picture of the region under discussion the usual procedure will be departed from in that the present drainage will be first considered. From the present drainage, the cycles of erosion from younger to older will be discussed, being taken up in reverse order of their occurrence."

WRIGHT, FRANK J.

HARRISBURG EROSION IN THE OLDER APPALACHIANS. Ann. Assoc. Amer. Geogr. 22: 85-86. March 1932. (1934)

A brief survey of the correlation of diversified levels of the Appalachian Valley peneplain or Harrisburg peneplain.

ZON, RAPHAEL.

HOW THE FORESTS FEED THE CLOUDS. In Science Remaking the World, pp. 212-222, illus. Garden City, Doubleday, Page & Co. 1923. (1935)

Shows how ". . . vegetation from land contributes more to the precipitation over land than evaporation from the ocean, that forests evaporate more water than free water surface or any other vegetation, and that transpiration of the eastern half of the United States is intimately connected with the prevailing south wind . . ."

DROUGHT

ANONYMOUS.

(1336)

DROUGHT AREA COMMITTEE REPORT URGES WATER AND SOIL CONSERVATION. GREAT PLAINS PROBLEM FOUND TO REQUIRE FARMING CHANGES, DAMS, WELLS, AND IRRIGATION SYSTEMS. *Engin. News-Rec.* 117: 349. September 3, 1936.

Unless there is readjustment of farming methods "the agricultural economy of the Great Plains will become increasingly unstable and unsafe." The committee advocates long-term readjustment, and it is contended that the "Federal Government must take the initiative both in guiding and in financing the needed public works," but without impairment of local and individual initiative. Remedies are proposed, and engineering measures discussed.

(1337)

DROUGHT EFFECTS DEEPER. (Editorial.) *Business Week*, pp. 5-6, illus. August 11, 1934.

"Crop damage increases rapidly and world prices advance spectacularly; \$5 billions is government's guess at havoc; million on relief rolls." Drought-prevention undertakings are criticized.

(1338)

THE DROUGHT PROBLEM REMAINS. (Editorial.) *Engin. News-Rec.* 117: 347. September 3, 1936.

Says that the report of the Great Plains Drought Area Committee, issued in August 1936, contributes "nothing toward a solution of the essential question, that of recurrent drought periods and the extension of farm settlement into a pasture belt." Attention is called to the urgent need for maximum conservation of water.

(1339)

THE DROUGHT TO DATE. *Engin. News-Rec.* 117: 320-321. August 27, 1936.

A summary of reports on stream flow, ground water, and water supply in drought areas by the district engineers of the Geological Survey. Reports, arranged alphabetically by States, on water supply in drought areas.

(1340)

"DUST-BOWL" INTO GRAZING LAND. *Lit. Digest* 121: 9. March 7, 1936.

The Government is undertaking a \$10,000,000 experiment in combating drought in the dust bowl of the West and Southwest. Projected for New Mexico, Texas, Oklahoma, and Kansas, the experiment calls for the purchase of 1,282,522 acres of land. Nearly 6,000 Pueblo and Navajo Indians will benefit. The plans call for the conversion of dust-bowl territory into grazing land, the transfer of farmers to better land, and improvement of the conditions of those who remain. Launched by the Resettlement Administration, the project will have the cooperation of the Soil Conservation Service, Civilian Conservation Corps, and the Bureau of Indian Affairs.

(1341)

INTRODUCTION INTO THE UNITED STATES OF DISEASE-RESISTANT PLANTS. *Science* 82: 54-55. July 19, 1935.

The seed of drought-resistant plants from Turkestan, Manchuria, Mongolia, and the Gobi Desert, brought back by the Department of Agriculture explorers is being grown in experimental greenhouses on the plant-reserve stations established by the Department. It is stated that the discovery of one desirable drought-resistant soil-binding species would repay the costs of the expeditions.

(1342)

IT WILL BLOW AGAIN. (Editorial.) *Country Gent.* 106: 20. August 1936.

This editorial stresses the importance of soil conservation practices in the high prairies of the Southwest for prevention of future serious droughts. A comprehensive survey of soils throughout the winter wheat belt is necessary to determine accurately which areas can be cropped and which will be forever unsafe for tillage.

(1343)

NATURE HELPS THE NEW DEAL. *Today* 6: 10, 20-21. May 2, 1936.

"During the summer of 1933 came dust storms in the Northwest—just in time to give initial impetus to the New Deal's soil-conservation and sub-

marginal-land-retirement programs. The great drought of 1934, however, turned the trick. The gigantic dust clouds which rolled out of the West, across the country and into the broad Atlantic dramatized the gravity of the soil-erosion problem as no other event in American history had ever done. Since then, statistics on the appalling loss of soil by wind and water erosion have made front-page stories, where previously they had never got much beyond Department of Agriculture bulletins. The continuation of the dust storms in 1935 and 1936 served as leitmotif to the haunting fear that America would soon go the way of the Gobi Desert, Mesopotamia and most of North Africa."

(1344)

NEW DROUGHT THREATS SPUR GOVERNMENT AID. N. Y. Times, sec. 1, p. 3. June 28, 1936.

"After a visit to the White House late to-day [June 27] Mr. Wallace announced the formation of a committee of six to coordinate drought relief efforts of his department and cooperate with the Works Progress Administration. 'This committee,' Mr. Wallace said, 'will begin work immediately. It will consider all matters relating to the drought, and will coordinate the activities of the various agencies and will formulate recommendations and plans to meet distressing conditions in the stricken areas.'"

(1345)

PRESIDENT ROOSEVELT'S VISIT TO THE WESTERN DROUGHT AREA; DROUGHT CONFERENCE IN DES MOINES. Com. and Financ. Chron. 143: 1491-1492. September 1936.

The President saw, among other works, a dam being built by farmers that will form a basin to serve the double purpose of a water hole for livestock and an impounding reservoir. He also drove to the site of a C. C. C. camp where a dam recently was constructed on a branch of the Missouri River.

(1346)

ROOSEVELT AND THE DROUGHT. Nation 143: 61-62. July 18, 1936.

The problem of drought is not one of control but of adaptation. Reorganization of the economic life of the high plains is necessary but will the administration dare to undertake it? Will it "reverse the error that transformed the semi-arid lands into unlimited private property, object of speculation and tragic deception? Or rock along with relief and futile patching in the hope that the next great drought will fall upon a remote administration?"

(1347)

WILL PONDS SOLVE THE PROBLEM? Prairie Farmer 109: 4, 20, illus. January 30, 1937.

Pro and con opinions are expressed on the Illinois plan for water conservation proposed by M. O. Kasson at a meeting of Gov. Horner's drought committee in the summer of 1936.

ADAMS, R. R.

(1348)

SERICEA: THE CHAMPION DROUGHT-DEFIER. South. Planter 97: 7, illus. August 1936.

The author describes experiences in growing *Lespedeza sericea* for hay and reports success with this plant in Virginia in stopping soil washing and restoring nitrogen to the soil. "Sericea, like alfalfa, comes up from the crown year after year but unlike alfalfa, it will in a few years kill out the weeds, crab, and wiregrass . . . and, unlike alfalfa, Sericea will grow on acid soil."

BARNES, S.

(1349)

EFFICIENT USE OF SOIL MOISTURE AS A FACTOR IN THE CONTROL OF DROUGHT. Sci. Agr. 16: 275-280. January 1936.

Experiments conducted in a typical dry-farming and cereal area in Canada are described. "Deep, watertight tanks, filled with soil as in the field, are used and crops are grown in this soil. The experiments are probably unique in that for the most part the only source of moisture for crops grown in the tanks comes from the natural precipitation. The crops do not appear to

suffer in the least by their novel environment except through a shortage of moisture." Results of soil-moisture experiments have shown that moisture is not used efficiently in the production of grain crops.

BECKER, H. L. (1350)
HE LEARNED FROM THE DROUGHT. U. S. Ext. Serv. Rev. 7: 15. January 1936.

In his annual report for 1935 a Wisconsin county agent tells of what he discovered in studying old drought-relief records of Oneida County, Wis. The farm-debt situation, size of farm, and farm income are all considered in this report.

BOWMAN, ISAIAH. (1351)
THE LAND OF YOUR POSSESSION. Science 82: 285-293. September 27, 1935.

This article discusses droughts and wind erosion, and the economic problems arising from these forces in the semiarid regions of the West. The author maintains that droughts cannot be stopped. "We can only provide to some degree against its effects." The chief method of control is stated to be a wiser policy of land utilization. Summation of recommendations call for soil-erosion research on field projects; withdrawal of wind-erosion districts of the Great Plains from cultivation for the purpose of instituting experiments and studies toward the restoration of a sod cover to be followed by supervised grazing; shelterbelt practices; and analyses of climatological records "... to help determine and define the areas and grades of serious agricultural risk."

BRUERE, M. B. (1352)
LIFTING THE DROUGHT. Survey Graphic 23: 544-547, illus. November 1934.

"Here is the epic of the drought—10 million cattle killed to save them, the long trek of a million more to green pasture, 'processing' of fruit, grain and meat as work-relief projects. More dramatic than relief is the long-term effort to prevent drought, to balance the nation's water-budget, and to try to teach 50 million people 'the decent use' of the good earth." Among other control measures, contour plowing and strip cropping are described.

CHASE, STUART. (1353)
BEHIND THE DROUGHT. Harper's Mag. 173: 368-377. September 1936.

This article traces the rainfall from the point on the height of land which divides one basin from another, that is from the top of the watershed, down the upland and lowland valleys to the ocean. It notes the problems and conditions, one after the other, which the water creates as it comes down, and concludes with the suggestion that there is no solution to the problems, "either for the continent or for man, except in co-ordinated control that comprehends all problems."

CONDRA, G. E. (1354)
THE RELATION OF DROUGHT TO WATER-USE IN NEBRASKA. Nebr. Univ. Conserv. Survey Div. Bull. 6, 24 pp., illus. November 1934.

Discusses rainfall, soil moisture, surface water, various types of wells, and irrigation. Uniform plant cover retards run-off and erosion, but weeds, while retarding run-off and erosion, waste much soil moisture in their growth.

Cox, W. T. (1355)
DO DROUGHTS EXPLAIN THE PRAIRIES? Amer. Forests 42: 556-557, illus. December 1936.

In tracing the history of the battle between forests and prairies the writer says: "As an explanation of the prairies, I ... suggest that the most adverse weather cycle or most severe drought occurring over a long period of time in any region determines the character of vegetation in that region."

CRONIN, F. D., AND BEERS, H. W. (1356)
AREAS OF INTENSE DROUGHT DISTRESS, 1930-1936. U. S. Works Prog. Admin. Research Bull. Series V (1), 54 pp., illus. Washington, D. C., 1937. [Processed.]

"The present bulletin is a preliminary effort to delineate areas of varying degrees of drought intensity and to select carefully defined sections as the basis for further study. It is the first of a series of three reports and will

be followed shortly by one on the population of this midcontinent drought area, describing the population shifts caused by unpredictable natural forces, and by another giving a brief history of relief and rehabilitation."

DAILEY, J. L. (1357)
IS THE WEST DRYING UP? *Nation's Agr.* 11: 2-3, 10, illus. September 1936.

"Weather experts assure us that there is no reason for holding such a pessimistic view . . . Series of droughts are bound to occur in the West. They are not caused by the cultivation of the Plains and cannot be prevented by the building of ponds and lakes." Article discusses causes of rain, droughts, and the work of various Government agencies in drought areas.

DETERS, M. E., AND SCHMITZ, HENRY. (1358)
DROUTH DAMAGE TO PRAIRIE SHELTERBELTS IN MINNESOTA. *Minn. Arg. Expt. Sta. Bull.* 329, 28 pp., illus. 1936.

The destructive effect of the 1934 drought is cited. The age and survival of different kinds of trees is discussed together with planting and care of shelterbelts. An appendix lists hardwood trees recommended for prairie planting.

DICKEY, SAM. (1359)
LESPEDEZA IN ROWS BEATS THE DROUGHT. *Farmer-Stockman* 49: 27. January 15, 1936.

The author recommends lespedeza planted in rows 3½ feet apart on land out of production to replenish it before it is completely worn out. "Korean lespedeza didn't so much as wither during the drought" in extreme southwest Oklahoma in 1935.

FAILYER, GEORGE H. (1360)
MANAGEMENT OF SOILS TO CONSERVE MOISTURE, WITH SPECIAL REFERENCE TO SEMIARID CONDITIONS. *U. S. Dept. Agr. Farmers' Bull.* 266, 30 pp., illus. 1906.

This bulletin furnishes practical information on dry farming in various sections of the semiarid West. Partial contents are: Drainage; Subsoil Plowing of Drained Lands; Listing Ground, and the Lister; Cultivation to Retain Moisture in the Soil; Conditions in the Semiarid Regions; and Crops for the Semiarid Regions.

FICK, J. C. (1361)
EROSION, PLANT GROWTH AND SOIL VARIETIES. *Farming in So. Africa* 11: 464-465. November 1936.

"The Drought Investigation Commission (final report, 1923) came to the conclusion that the decrease in the vegetal covering, resulting from deforestation, over-grazing and veld burning, is the actual cause of soil erosion." Sheet erosion, soil type as a factor determining erosion, and the laying out of new and old lands are discussed.

FÜLGHUM, RALPH. (1362)
MASTER FARMER THROUGH THE DROUTH. *Prog. Farmer (Ga.-Ala. Ed.)* 51: 9, illus. September 1936.

An example of terracing and turning cover crops into soil which paid. Because for the last 32 years, J. A. Johnson, of Jackson County, Ga., has followed these farm practices, "he has soil that is filled with organic matter, soil that picked up every bit of the moisture available earlier in the year and held it for use when the crops needed it during the drouth."

FULLER, H. T. (1363)
EFFECTS OF DROUGHTS AND WINDS ON ALLUVIAL DEPOSITS IN NEW ENGLAND. *Bull. Geol. Soc. Amer.* 3: 148-149. 1892.

"For twenty years or more I have been watching with much interest some slow changes of the surface of terrace formations in the valleys of New England rivers . . . We know that these terraces in the valleys of the southwestern part of the territory mentioned were once covered with a magnificent growth of pine and elm and chestnut . . . Now, however, portions of these terraced slopes are becoming absolutely desert, as bare of any vegetation as are the tracts of the African desert westward from the meadows of the Nile. The object of this paper is to direct the attention of

the Society first to the facts . . . and secondly to the causes as determined by long continued observation." Measures for remedying these effects of erosion are given.

HARRISON, G. R. (1364)

BEATING THE DROUGHT WITH SWEET CLOVER AND ALFALFA. *Hoard's Dairyman* 81: 562, illus. November 10, 1936.

"Sweet clover actually tills subsoil and softens and pulverizes it." Various farmers were interviewed as to the respective values of clover and alfalfa as pasture for cows.

HARROLD, L. L. (1365)

FREQUENCY, EXTENT, AND SEVERITY OF DROUGHTS SINCE 1881. *Engin. News-Rec.* 114: 478-479. April 4, 1935.

In tabular form the author presents drought results which have directed the attention of engineers to approaching limits of water supplies as related to various human activities.

HENDERSON, C. A. (1366)

LETTERS FROM THE DUST BOWL. *Atlantic Monthly* 157: 540-551. May 1936.

The writer describes in detail agricultural conditions on one farm in Oklahoma with special reference to drought and resulting dust storms. The author went with her husband, soon after their marriage in 1908, to a farm in Eva, Okla. She says, "only people like ourselves who have invested their lives in the 'short grass' country know the sorrow of seeing these hard-won acres 'all up in the air'." She sketches the introduction of contour planting and terracing in her county in 1935, and the soil-erosion program in general.

HENRY, A. J., HUMPHREY, H. B., AND KADEL, B. C. (1367)

THE GREAT DROUGHT OF 1930 IN THE U. S. SUPPLEMENTAL NOTES. *U. S. Monthly-Weather Rev.* 58: 396-401, illus. October 1930.

Discusses the influence of trees and associated undergrowth on the rate of stream discharge during the drought. Tabular data show daily maximum and minimum rate of water discharge of stream at Cabin John, Md., for the 28-day period, September 15 to October 12, 1930.

HOWARD, J. R. (1368)

FARMERS ENTER NEW YEAR WITH RENEWED HOPE, DESPITE DANGER OF MORE DROUGHT. *Annalist* 49: 116-117. January 22, 1937.

The author reviews farm conditions at the close of the crop year and lists among the causes of curtailment during 3 unproductive years insect and drought menaces. Soybeans as a standard farm crop are considered a promising venture. The A. A. A. program and owner operation are discussed. "In a way it is a hopeful indication but mighty hard on a lot of good farm tenants, only a few of whom are able to purchase a holding of their own."

HOYT, J. C. (1369)

CONSERVING WATER TO MEET DROUGHT. *Conservation* 2: 1, illus. June 1936.

Investigations concerning all available water supplies, their fluctuations, and the possibilities for their conservation should be made, and information should include "climatic records, especially of precipitation; records of stream-flow from which both the total flow and the distribution of flow that may be expected may be estimated; and records of fluctuations of the ground-water table, with other information relative to ground-water supplies."

(1370)
DROUGHTS OF 1930-34. U. S. Geol. Survey. Water-Supply Paper 680, 106 pp., illus. 1936.

"This report summarizes, as an aid to the more detailed analyses that will arise in the consideration of specific projects, some of the more outstanding questions related to droughts, both physical and economic. It outlines the nature and extent of the droughts of 1930-34; compares them with past dry periods in terms of precipitation, run-off, ground water, evaporation, and transpiration; and sketches the effects of droughts on

water supplies as related to a variety of human purposes, including agriculture, domestic and industrial uses, health, power, navigation, and recreation and wild life; it also touches upon the relief, political, and economic elements."

KANSAS AGRICULTURAL EXPERIMENT STATION.

(1371)

EIGHTH BIENNIAL REPORT OF THE DIRECTOR, 1934-36. 144 pp. 1937.

Results of drought and soil-blowing in 1934 are discussed, pp. 9-11. "... in western Kansas practically all fields that had been prepared for wheat were without a protective cover of vegetation when the strong winds started to blow in 1935." The writer gives information on soil conservation, and soil erosion and water conservation on pages 28-33, and 123-124, respectively.

KNAPP, G. S.

(1372)

WATERING THE GREAT PLAINS. Engin. News-Rec. 116: 664-665. May 7, 1936.

"Effective conservation of groundwater, the Plains' most vital reserve against recurring periods of drought, awaits intensive engineering study and a more satisfactory group of water-right laws."

KOLLMORGEN, W.

(1373)

RAINMAKERS ON THE PLAINS. Sci. Monthly 40: 146-152. February 1935.

In tracing the history of what was for three centuries called the Great American Desert the author examines the claims of early writers who were convinced that increased precipitation was due to afforestation and cultivation by the pioneers. "The fiction of increased rainfall on the plains proved so popular and profitable as to evaporate all interrogations as to its validity. In the late eighties and nineties occurred a series of dry years. Crop failure followed crop failure. A beautiful theory of increasing rainfall became but a haunting and mocking memory to thousands who saw their substance wasting and parching about them."

LEVIN, JACK.

(1374)

THE GREAT PLAINS COMMITTEE REPORT. Plan Age 3: 76-82. March 1937.

The author reviews "The Future of the Great Plains," the report of the President's Great Plains Committee issued in 1936. This report comprises four main parts: Statement of the Underlying Problems; Programs of Action, in General; Specific Methods of Effecting Programs Under Existing Practices, Laws, and Agencies; Experiments, Suggestive Associations, and Model Laws. "The vital damage by wind and water erosion is related vividly. In soil wastage we learn that overgrazing, the tremendous expansion of tilled acreage, the reduction of the organic matter in the soil, and a succession of years of low rainfall are the chief factors that have made possible the recent great increase in soil impairment and destruction."

McKEE, CLYDE.

(1375)

REGASSING DRY FARM LANDS. Natl. Wool Grower 27: 10-12, illus. July 1937.

Excessive use of the sparse vegetative cover, especially during periods of drought, has exposed the thin surface soils of the Great Plains to serious losses through erosion by both wind and water. The writer outlines the results of experiments with crested wheatgrass conducted by the Montana Agricultural Experiment Station. Factors considered in the studies were preparation of the land, moisture conditions, rainfall, the grazing season, and investment aspects.

MAIN, T. C.

(1376)

DROUGHT AND SOIL-DRIFTING IN WESTERN CANADA. Engin. Jour. [Canada]. 15: 297-307, illus. June 1932.

Pointing out that for 3 years precipitation has been subnormal in a portion of western Canada, the author gives an outline of the factors on which climate, weather, and precipitation depend and analyzes the relations between precipitation and yield in various portions of the prairie belt. He explains the effect of soil drifting, suggests as solutions for the present difficult situation, the systematic planting of hedges, forestry-conservation methods, the retention of sloughs and lakes, and the establishment of

storage dams for spring run-off water, and says that it may be possible for agricultural experts to develop a kind of wheat which would require less water than do the present varieties. The use of strip farming is advocated to minimize soil drifting while the hedges are growing.

MARAI, J. G. (1377)

DROUGHT-RESISTANT FODDER CROPS. *Farming in So. Africa* 10: 340, 352. August 1935.

Describes the value of spineless cactus and saltbush as fodder for dry and semidry regions of South Africa. American aloe and creeping saltbush are recommended for drought-area fodder and erosion control.

MARTIN, JOHN A. (1378)

THE DUST BOWL—SOIL CONSERVATION—THE NEW FARM BILL. *Cong. Rec.*, pp. 2575-2576. February 21, 1936.

The dust storms in the Great Plains country are more than a local problem. A program of preventive measures must be on a long-time basis. "The appropriation of \$2,000,000 is for a superficial and temporary treatment only . . . There is only one way by which this great and growing menace can be combated and conquered and that is through soil conservation . . . a long time program . . . must take in much more territory than the so-called Dust Bowl or the still larger drought area."

MEYER, A. F. (1379)

RAINFALL CHANGES. *Bull. Amer. Met. Soc.* 17: 102-105. April 1936.

A study of land evaporation and transpiration and wind movements over Minnesota is presented with special reference to drought prevention. Describes carragana-hedge plantings in Saskatchewan for the conservation of snow water on wheatlands.

MUNNS, E. N. (1380)

A STUDY OF THE EFFECT OF DROUGHT ON TREES. *Science* 84: 136. August 1936.

"As information on drought resistance of trees and shrubs is sadly lacking, the present affords an unusual opportunity to obtain data of outstanding value . . . Such information is not alone of scientific interest but has great practical value in many current operations, such as the reforestation program of the C. C. C., cultural operations in the forest, erosion, and flood control, etc." The United States Forest Service, Division of Silvics, is undertaking the collection of data on the drought damage on such features as the nature, extent, and character of the damage, the relative resistance of trees growing on different sites.

PEEL, W. F. (1381)

THE SOIL CONSERVATION SERVICE DROUGHT PROGRAM OF 1936. *Soil Conserv.* 2: 204-207, illus. March 1937.

"The work of the service has been concentrated chiefly in the most seriously affected areas in the Plains states and the regions east of the Mississippi River . . . approximately 2,900 erosion-control projects have been established." The author tells of the helpful work of these projects and its educational value to the farmer. He advocates land-use programs that can be made to cooperate with nature for the prevention of extreme dearth and floods.

PULLING, H. E. (1382)

HOW PLANTS FIGHT DROUGHT. *Sci. Monthly* 41: 176-179. August 1935.

"Tests by the Forest Service show that windbreaks in Kansas and Nebraska reduce evaporation in their lee by as much as 70 per cent. Though this effect decreases with distance, yet it was measurable about twenty times as far from the windbreak as the windbreak was high."

RICHARDSON, R. N. (1383)

SOME HISTORICAL FACTORS CONTRIBUTING TO THE PROBLEMS OF THE GREAT PLAINS. *Southwest. Social Sci. Quart.* 18: 1-14. June 1937.

This paper deals with the history of events and movements that brought about the present conditions of droughts, sand and dust storms, and general physical problems of the Midwest. The author attributes soil erosion chiefly to overgrazing. Address delivered before the Southwestern Social Science Association, Dallas, Tex., March 26, 1937.

- SAVAGE, D. A. (1384)
 "THEY CAME THROUGH"—SURVEY SHOWS WHERE DROUGHT MET MOST RESISTANCE. U. S. Soil Conserv. 1: 4-5. September 1935.
 "Several hundred quadrat studies taken under various conditions have revealed that drought damage to the grasses seemed directly and positively correlated with the severity of drought intensity of gravity and proximity of cultivated fields. Heaviest damage was noted on small, closely grazed pastures badly scarified by dust-laden winds." These studies pertain to areas and conditions in Oklahoma, Nebraska, Kansas, Texas, and Colorado.
- SMITH, J. R. (1385)
 THE DROUGHT, ACT OF GOD AND FREEDOM. Survey Graphic 23: 412-414, illus. September 1934.
 In discussing such evils of drought as crop failures, wind erosion, etc., the author recommends a three-point policy as follows: (1) The carrying of calamity reserves in the form of unused credit in regions where agriculture is reasonably dependable; (2) restoration of grass acreage in regions where agriculture is not dependable; and (3) rigid legislation that will keep individuals from destroying the land.
- SOUTH DAKOTA STATE PLANNING BOARD. (1386)
 RECOMMENDATIONS . . . TO THE EMERGENCY DROUGHT CONFERENCE CALLED BY THE CENTRAL NORTHWEST REGIONAL PLANNING COMMISSION, RAPID CITY, SOUTH DAKOTA, AUGUST 21-22, 1936. S. Dak. State Planing Bd. 14 pp. 1936. [Mimeographed.]
 This report, part III of the Central Northwest Regional Planning Commission's report and recommendations on Great Plains area problems, includes recommendations on soil and water conservation and urges the cooperation of all State and Federal bureaus.
- THONE, FRANK. (1387)
 THE IMPENDING DESERT. Sci. News Letter 26: 106-107. August 18, 1934.
 Erosion attacking farm lands, grazing areas, and forests cuts the soil into sterile gullies which are useless for centuries. During a drought over China, with famine certain to follow, and a dust storm raging outside, a scholarly Chinese said: "These droughts, dust-storms and famines are just what you Americans are in for unless you wake up in time. I can understand them in China because the damage was done centuries . . . before people knew what deforestation and bad farming could do to a nation. But I cannot understand a country like the United States allowing such a thing to happen." The need for keeping the soil by means of grass and trees on sloping lands is stressed.
- UNITED STATES RESETTLEMENT ADMINISTRATION. (1388)
 LONG TIME PROGRAM FOR DROUGHT RELIEF URGED. U. S. Resettlement Admin. Land Policy Cir. 31 pp. October 1936.
 On pages 10-12 the Iowa State Planning Board land-use recommendations are listed which encourage soil conservation measures through education, demonstration, benefits, and other services.
- WALTON, F. H. (1389)
 THE DROUGHT. Indians at Work 4: 6-8. August 15, 1936.
 Drought conditions in the Great Plains caused by improper drainage projects of the past few years are discussed. Various emergency methods of impounding water and distributing snow water and rainfall to prevent further drought are suggested.
- WEAVER, J. E., AND ALBERTSON, F. W. (1390)
 EFFECTS OF THE GREAT DROUGHT ON THE PRAIRIES OF IOWA, NEBRASKA, AND KANSAS. Ecology 17: 567-639, illus. October 1936.
 Studies of the environmental factors and structures of various prairies with changes in cover vegetation are presented. From extensive findings the authors state "all of the native grasses suffered some loss, but death was greater among those with relatively shorter roots . . ." Native grasses which have almost entirely disappeared and native forms which have increased are listed.

- WEAVER, J. E., STODDART, L. A., AND NOLL, WM. (1391)
RESPONSE OF THE PRAIRIE TO THE GREAT DROUGHT OF 1934. *Ecology* 16: 612-629, illus. October 1935.

Eastern Nebraska is the area considered. Factors discussed are: Water content of soil; responses of grasses and forbs; effect on flower production; relation of depth of rooting to endurance of drought; retention of water and osmotic pressures; environment during the most intense period of drought; behavior of species on uplands and behavior of species on lowlands.

Literature cited, page 629.

- WILSON, C. M. (1392)
SAGA OF DROUGHT. *Commonweal* 20: 463-465. September 14, 1934.

A comparison of the droughts of 1930 and 1934. Maintains that the former was more regional than the latter and that the problem is essentially one of distribution.

ECONOMIC AND FARM MANAGEMENT PHASES OF SOIL CONSERVATION

- ANONYMOUS. (1393)
COL. LOWDEN ON SOIL CONSERVATION. *Agr. Engin.* 17: 43-44. February 1936.

"History records a long line of great metropolitan centres that disappeared because they neglected the countryside which nourished them." Approves of a program that would "curtail waste and destruction of soil, safeguard the American living standard, insure the future welfare of urban and rural residents alike, and assure coming generations adequate food at reasonable prices."

- (1394)
CONSERVE THE SOIL. *Better Crops with Plant Food* 20: 28. November-December 1935.

The author views the Nation's blindness to the need for soil conservation "as not just an agricultural problem, but one of far-reaching and social significance, for it is impossible to substitute any other medium for soil in the culture of plants, without which human and animal life could not long continue."

- (1395)
EROSION CONTROL PROJECT CARRIED ON TWO YEARS IN WESTERN WISCONSIN. *Wis. Agr. and Farmer* 63: 3, 12. April 11, 1936.

A description of protective farm management and engineering methods used to save the topsoil of Coon Creek area in western Wisconsin.

- (1396)
LET'S STOP DESTROYING OUR WEALTH! *Wallaces' Farmer* 60: 2. April 13, 1935.

"Loss of fertility is the great destroyer of wealth in our day. We will never stop that destruction until we make it possible for farmers to plant no more crops than the market needs, and to be aided in their efforts to get land back to grass."

- (1397)
REMODELING FARM PRACTICES AT GARLAND. *Farm and Ranch* 55: 14. May 1, 1936.

Notes are presented on soil conservation work in Dallas County, Tex., including reclamation of pastures, strip cropping, and drainage methods.

- (1398)
SOIL CONSERVATION AND SOCIAL RECONSTRUCTION; THE SOCIAL IMPLICATIONS OF THE PROBLEMS OF SOIL-EROSION CONTROL ARE DEEP AND FAR-REACHING. *Save Our Soil* 1: 1-2, illus. April 1936.

Indicates that "conservation, by its very nature, is a public problem, not a private one, and it is a problem that demands for its successful solution a distinct shift in our fundamental social and economic concepts."

ANONYMOUS.

(1399)

SOIL CONSERVATION PLAN. Wis. Agr. and Farmer 63: 1, 6. April 25, 1936.

Presents soil conservation campaign plans and progress to date on Green Lake, Dane, and Calumet County farms in Wisconsin as typical examples. Crop plan drawings are included, and soil-depleting crops pointed out.

(1400)

UNITED STATES TO COMBAT SOIL EROSION BY TERRACING FARMS. Pop. Mech. 60: 514. October 1933.

The Federal program for financing farmers is briefly stated. "Conservation of the fertile top soil . . . will tend to maintain the value of land held as security for long-term loans . . ."

ALEXANDER, W. W.

(1401)

SOME FACTS ABOUT FARM TENANCY. South. Prog. 1:13, 27. October 1936.

The writer states that there has been a steady increase in tenancy during the past 50 years; an increase in white tenants and a decrease in Negro tenants. The need for diversification of crops, soil destruction, and the poverty of the tenant are discussed. "The tenant system stands directly in the way of agricultural diversification."

ALLIN, B. W.

(1402)

MIGRATION REQUIRED FOR BEST LAND USE. Jour. Farm Econ. 18: 493-499. August 1936.

The author states that "the Great Plains is the problem area of greatest importance from the standpoint of population redistribution." After mentioning other problem areas he says: "Altogether, five million people, or 15 percent of the present farm population, would have to move in order to promote what is here regarded as the best use of the land. Probably four million of this total are in the problem areas . . . The entire five million could leave agriculture without causing a significant reduction in commercial farm output." Paper presented at the twenty-sixth annual meeting of the American Farm Economic Association at New York, December 27, 1935.

(1403)

SOIL CONSERVATION—ITS PLACE IN NATIONAL AGRICULTURAL POLICY. U. S. Agr. Adjust. Admin. G-54, 27 pp. March 1936.

Soil conservation requires more than physical methods. "In recent months much has been written concerning the depletion of land resources. For the most part, however, attention has been centered on the destructive effects of soil erosion and the physical methods required for their prevention. The present pamphlet is an effort to meet a long-felt need for a clear exposition of the more important economic aspects of the soil-conservation problem and their relation to other elements of national agricultural and industrial policy. If our present knowledge of the physical approaches required for soil conservation is to have widespread effect on farm practices, economic conditions and relations must be favorable."

ALSPACH, C. B.

(1404)

A COUNTY AGENT DISCUSSES SOME THEORIES ON NATURE'S ANSWERS TO FARM PROBLEMS. U. S. Ext. Serv. Rev. 7: 152-153. October 1936.

"Nature cures while man endures" should not be relied upon in connection with soil conservation. Nature is too slow in repairing soil loss, as authentic illustrations on record show. A single hard rain on an unwisely cultivated field may carry away more fertility than Nature could restore in 400 years. The writer contends that it is man's duty to preserve and at the same time use the fertility of the soil. "Nature, supplemented with an intelligent production program by man, can avoid . . . distressing extremes so that all may have plenty always."

AMERICAN BANKERS ASSOCIATION

(1405)

CROPS FOR SAFE FARMING. Amer. Bankers Assoc. Agr. Comn. 32 pp., illus. 1936.

The selection of crops which have proved valuable in good farm management, and which contribute to soil conservation are listed as soil-depleting, soil-conserving, and soil-improving crops. Controllable factors affecting crop

and soil resources and their relation to credit agencies are discussed. "Permanent flood control, as well as permanent agriculture, involves erosion control over the entire watershed from ridges to river channels."

(1406)

"FACILITATING FARM CREDIT" AS VIEWED BY BANKERS AT REGIONAL CONFERENCE FORUMS, MEMPHIS, TENN., AND CHICAGO, ILL. Amer. Bankers' Assoc. Agr. Comm. Bull. 10: 1, 4. June 1936.

Carl Hollis spoke on soil erosion and farm credit. H. L. Young expressed the opinion that "industry holds valuable lessons for the farmer . . . There is no reason why such principles cannot be adapted to our farm problem. Better cultivation; better seed; better methods of fertilization; studies of soil erosion and how to combat it . . . all these and more form the basis for giving both the farmer and the consumer more products at less cost."

BALL, J. S.

(1407)

WASTE LAND AND WASTED LAND ON FARMS. U. S. Dept. Agr. Farmers' Bull. 745, 18 pp., illus. 1916.

The writer discusses efficient use of land, productive and unproductive land, the farmstead, the study of land utilization of 1,703 farms, and the influence of land tenure. "The results of this study . . . serve to call attention to the fact that there are certain portions of any farm which contribute nothing to the farm income, and to suggest various ways through which more or less of such unproductive land may be reclaimed on the average farm."

BENNETT, H. H.

(1408)

INFLUENCE OF EROSION ON FARM LAND VALUES. Ann. Real Estate Practice, pp. 716-735, illus. Natl. Assoc. Real Estate Bds. Chicago, Ill. 1930.

"Soil impairment and destruction by erosion constitute one of the most important problems confronting American agriculture." The lowering in value of farm acres in Iowa, Missouri, and Texas through erosion is shown, and examples of land wastage in many States are described and illustrated. The remedy lies in an effective soil conservation program. "To get a thorough-going, far-reaching program into practice is going to require first a tremendous amount of awakening among farmers, land owners, bankers, merchants, and others, as to the seriousness of the problem; and . . . a vast amount of research and demonstration work under the varying conditions of soil, slope, and climate that characterize this great Nation."

BILL, E. T.

(1409)

LANDLORD, TENANT, AND SOIL FERTILITY. Hoard's Dairyman 52: 302. September 22, 1916.

A description of Herbert Powell's system of keeping up the soil on his 22 tenant farms in Livingston County, Ill. He rents them on shares, with a 5-year lease, stipulating certain things that must be done by the tenant to keep up the farm. The success of this system is proved by the account-book record he keeps on each farm.

BLAIR, M. M.

(1410)

A PICTURE OF FARM TENANCY IN TEXAS AND OKLAHOMA. Farm and Ranch 55: 3, 9. April 1, 1936.

This is the first of a series of three articles on the tenancy problems of Texas and Oklahoma. The present article is concerned with the growth and the evils of tenancy. Special attention is called to the poverty of tenants, increase in soil erosion, general decay of rural communities and rural institutions, and the decline of democracy. "If all of Texas and Oklahoma were now terraced to perfection, the terraces would soon wash away, neglected and left in ruin by transient tenants." Special interest in land preservation can only be roused by ownership of the land.

BRANDT, KARL.

(1411)

POTENTIALITIES OF AGRICULTURAL REFORM IN THE SOUTH. Social Research 3: 434-458. November 1936.

"Soil, topography and climate are factors operating toward a shift of the center of gravity of cotton culture. The situation would be desperate if the South had to go on as before, producing cotton on eroded soils, but

this is by no means necessary. A shift to mixed farming will make possible not only a utilization of these soils but their gradual repair."

BRIGGS, FRANK A., ed.

(1412)

WHY I AM INTERESTED IN AGRICULTURE. *Farm and Ranch* 56: 12. August 1, 1937.

An interview with Albert T. Clifton. When asked why he was interested in agriculture, Clifton replied: "I am interested in agriculture because farmers are my customers . . . In my opinion the conservation of soil and moisture is our important problem and the Government is justified in making an effort to make the people conscious of the need for immediate action . . . We need better farm and soil management. We should think less of immediate profit and plan more on profits in later years."

BRINK, WELLINGTON.

(1413)

LOOKING DOWN A 5-YEAR ROAD IN SOUTHWESTERN OHIO. *Soil Conserv.* 2: 120-122, illus. December 1936.

The author visited the Wayne Stephenson farm in 1936 and, with the help of a land-use map for 1935, 1936, and 1940, shows the results and expected results of a well-managed farm "founded on statistics and sweat, experiments and experience." He stresses the necessity for cooperation of farmers and Government in planned erosion-control measures.

BURGER, E. K.

(1414)

FAR-REACHING EFFECTS OF FLOOD RELIEF ON BUSINESS AND INDUSTRY. *Mag. Wall Street* 42: 910-911. September 22, 1928.

The Federal Government's huge program of flood protection extending over the next 10 years, to cost \$325,000,000, is discussed. The plan is described, and it is pointed out that development follows protection. This large expenditure is destined to produce far-reaching effects throughout the business structure. New territory and new opportunity for growth and expansion are being made.

BUTLER, TAIT.

(1415)

WILL THE NEW PROGRAM INCREASE SOUTH'S LIVESTOCK PRODUCTION? *Prog. Farmer (Car.-Va. Ed.)* 51 (10): 6, 50, illus. October 1936.

"The effects of the soil conservation program, following the control of the production of cotton and tobacco, on the production of livestock in the South have aroused much national interest. Outside of the South the impression seems to be that it will mean such an increase in livestock products in the South as to seriously impair the splendid market which the South has furnished for the farm products of other sections. Dr. Butler takes us into the question as it affects the entire future welfare of the South and nation."—Editor.

C., I. N.

(1416)

LAND USE PLANS. *Dakota Zephyr* 2 (2): 26-40, illus. March-April 1936. [Mimeographed.]

Gives several examples of land utilization, with field plans and rotation suggestions which provide good farm-management practices in maintaining and improving the fertility of the soil, and in controlling erosion. The program consists of the use of the following methods: Strip cropping with alternating row crops; use of a good rotation; cover for unprotected land; a cloddy surface soil condition; incorporation into the soil of all crop residues including stubble; and the general use of alfalfa, sweetclover, and native grass, especially on severely eroded fields.

CAPPER, ARTHUR.

(1417)

FARM TENANCY MUST BE REDUCED. *Capper's Farmer* 48: 1, illus. August 1937.

The author discusses the disadvantages of shifting tenants. "Soil erosion and brief tenancy go hand in hand. The tenant who remains on the land only a short time will seldom farm it properly . . . Both the tenant and the land owner and also the land lose by this system."

- CHAMP, F. P. (1418)
BANKERS' OPPORTUNITY IN SOIL CONSERVATION PROGRAM. Amer. Bankers' Assoc. Agr. Comn. Bull. 10: 1, 4, illus. July 1936.

The writer states that "bankers can and should play an important part in the development and maintenance of a sound soil conservation program. Through their control of a substantial portion of the short-term agricultural credit, and the key positions which they hold in their communities, they can wield a powerful influence to promote soil-building practices on the farm, and a use of the range which will insure watershed protection and sustained forage and timber yields."

- CHARLES, TUDOR. (1419)
PROTECTION FOR YOUR INCOME AND YOUR SOIL. Kans. Farmer 74: 3, 21, illus. March 14, 1936.

The author discusses farm practices in Kansas and the use of various crops. "A soil plan for Kansas should result in more home-raised cattle, sheep, horses and mules; fewer long-fed and more grass-fattened cattle and sheep; and a comfortable surplus of hay; more ample pasture; less soil erosion; and lower operating expenses."

- CLARK, NOBLE. (1420)
MANAGEMENT AND USE OF AGRICULTURAL LANDS. Agr. Engin. 18: 297-300, illus. July 1937.

Erosion research is divided into the following categories: (1) A measurement of the amount and character of soil and water losses from different soil types, crops, etc.; (2) attempts to evaluate the effectiveness of present methods of erosion control and to evolve new and better methods; and (3) determination of the economic and governmental issues involved in such questions as the division of costs of erosion control between the landowner and the public. In proposing improved soil-conservation policies in line with these divisions, the author recommends a more coordinated program encouraging the aid of the individual farmer.

- CLEMSON AGRICULTURAL COLLEGE. (1421)
THE SIGNIFICANCE OF LAND SLOPE. Clemson Agr. Col. Agr. Ed. 13: 99-131, illus. March-April 1937.

"These issues of Agricultural Education are published to emphasize the significance of the slope of land and to help farmers and farm boys plan their farming programs in relation to the slope of the land on their farms." Herein are discussed the relation of the degrees and lengths of slopes to erosion losses, the relation of slope to soil conservation practices, relation of slope to land uses, cropping systems, and tillage practices. The data presented here are in most cases taken from controlled plots which are comparatively small in area.

- TECHNIQUE TO BE USED IN APPRAISING THE SURFACE FEATURES OF A FARM. (1422)
Clemson Agr. Col. Agr. Ed. 11: 82-111, illus. February-March 1935.

"This issue of 'Agricultural Education' is devoted to the description of a technique to be used in appraising the surface features of a farm. An attempt has been made to make the technique understandable by applying it to two farms, one located in the Piedmont region, and the other in the Coastal Plain region of South Carolina . . . The appraising of a farm is a job that calls for training and experience . . . The technique and procedure set forth . . . are for studying such surface features as follows: Soil types; Degree of erosion; Topography; Drainage; Condition of terraces; Present use."

- COHEE, M. H. (1423)
THE APPLICATION OF FARM MANAGEMENT DATA IN FARM PLANNING. Soil Conserv. 2: 262-264, illus. May 1937.

"Production can be maintained, farm organizations properly balanced, soil conserved by careful planning." To illustrate this assertion the author gives detailed data on a farm-management plan for a typical farm.

COHEE, M. H.

(1424)

FIELD OPERATION TIME REQUIREMENTS AS AFFECTED BY CONTOUR-STRIP CROPPING IN AN EROSION CONTROL PROGRAM. U. S. Soil Conserv. Serv. SCS-R5-MS-4. 1936. [Mimeographed.]

Data were obtained on 35 farms in the Coon Creek area of Wisconsin during 2 years (1934 and 1935). The study is divided into two parts—(1) the amount of time required to work strip contour fields as compared with the time required to work irregular fields, and (2) the amount of time required to work the crop land of a farm completely reorganized along conservation lines as compared with the time required to work that same farm before it was reorganized, i. e., when it was farmed in the old way.

—, and DAVIS, R. H.

(1425)

CHECKING EROSION IN THE UPPER MISSISSIPPI VALLEY, COON CREEK WATERSHED. Jour. Land and Pub. Utility Econ. 11: 240-247. August 1935.

A diagram of the erosion-control program for a representative farm together with maps and tables are shown. Farmer cooperation toward erosion control is discussed. "In time, perhaps, every farmer will of necessity become a 'true agriculturist', as in the meaning of the term in some European countries where each foot of soil is treated with care."

COMPTON, K. T.

(1426)

LET'S GO PARTNERS. Country Home 60: 11-13, illus. June 1936.

American agricultural problems are discussed. "The national program of soil conservation now being undertaken through Congressional authorization will be a major step forward—if it is administered wisely for the purpose of soil conservation and not merely as an excuse for gaining other objectives. The argument of the present article merely urges that it be supplemented by equally vigorous and intelligent action in the direction of developing new outlets for agricultural products."

CORNELL, F. D., JR.

(1427)

A SOCIAL AND ECONOMIC SURVEY OF THE SPENCER SOIL-CONSERVATION AREA. W. Va. Agr. Expt. Sta. Bull. 269, 36 pp., illus. 1936.

The author sets forth the factual data regarding conditions in the Spencer area. "The plan was to make a study in the area before any effects of the demonstration program had been realized. Such study was then to be repeated after five years."

COX, J. F.

(1428)

SOIL FERTILITY STEPS UP. U. S. Ext. Serv. Rev. 6: 131-132, illus. October 1935.

The author discusses the important work of county agents in accelerating adoption of better farm practices. A brief survey of the work of the A. A. A. is made.

CRADDOCK, P. G.

(1429)

THE EFFECTS OF SOIL TYPE AND EROSION ON CERTAIN FACTORS AFFECTING COSTS AND RETURNS IN PRODUCING TOBACCO IN PITTSYLVANIA COUNTY, VIRGINIA, 1933. Va. Farm Econ. 36: 567-569. August 1936.

Data for 380 farms in the Banister River soil erosion service area for the farm year 1933 furnish the basis for this report. It is shown that "the yield per acre increased consistently as the amount of erosion decreased . . . there was an upward trend in the price received for the tobacco as the amount of erosion decreased." There were four important soil types—Cecil, Madison, Appling, and Granville. Appling showed the least erosion, and Granville was a close second. Most serious erosion occurred in Madison soils.

CRICKMAN, C. W.

(1430)

FARM MANAGEMENT SITUATION IN THE CORNBELT. U. S. Dept. Agr. Agr. Situation 20: 8-10. February 1936.

The economic position of Corn Belt farmers is considered. "Cornbelt farmers are faced with major immediate and long-time problems of management. One year of severe drought and 2 years of production control under the A. A. A. have brought about significant changes in crop acreages and livestock numbers."

- DAVIS, ARNOLD. (1431)
FARM ROADS IMPORTANT IN COORDINATED EROSION CONTROL PROGRAM. U. S. Soil Conserv. Serv. News (Region 4) pp. 1-3, illus. April 1937.
Drawings show how the location and construction of farm roads and trails is of great importance in an erosion-control program for the farm.
- DAVIS, C. C. (1432)
LOST ACRES. Amer. Mag. 121: 63, illus. February 1936.
A quotation from a pamphlet recently published by the American Bankers Association states: "Soil erosion . . . now menaces the economic and social security of millions of people. Its continuation for another 100 or 150 years may make impossible a self-sustaining agriculture in the United States." The adjustment programs of 1934-35 and results obtained are discussed. "The nation's agricultural plant is getting an overhauling it has badly needed ever since war and depression disrupted sound farm practices."
- DIXON, H. M. (1433)
FARM MANAGEMENT IN THE OZARK REGION OF MISSOURI. A STUDY OF THE ORGANIZATION AND OPERATION OF A NUMBER OF REPRESENTATIVE FARMS. U. S. Dept. Agr. Bull. 941, 51 pp., illus. 1921.
"This bulletin is based on a study of the organization and management of 79 farms distributed in five counties in the southern and south-eastern Ozark region of Missouri. Thirty-one of these farms are representative of the conditions of rolling and hilly upland farms; the other 48 are more representative of the conditions on the valley and level-upland farms. Throughout the bulletin these two classes of farms are treated separately. Data are presented on size of farms, distribution of farm area, capital, receipts, and expenses, and the returns in farm income and labor income."
- DORSEY, R. W. (1434)
SOIL CONSERVATION AS A FACTOR IN FARM FINANCE. Northwest Sci. 10: 3-5. February 1936.
A study of farm mortgages and mortgage foreclosures based upon soil fertility and soil deterioration from overuse and erosion resulting from intensive farming.
- DUCK, R. W. (1435)
LIVE STOCK AND DAIRY; SOIL CONSERVATION AND LIVE STOCK. Rural New Yorker 95: 470, illus. May 16, 1936.
States that the new soil conservation program will effect "... profound national changes relative to land tenure and grain crops . . . and will have an equally important influence on all kinds and classes of market livestock." How the new law affects directly or indirectly the raising of beef cattle, dairy cattle, hogs, and sheep is explained.
- DULEY, F. L. (1436)
EROSION CONTROL AND FARM MANAGEMENT. Kans. State Bd. Agr. 54: 29-37. 1935.
Measures for erosion control are suggested such as practical cropping systems, contour cropping, terracing, and gully control. "What we are trying to do is to develop a complete soil erosion or farm management program on each farm . . ."
- ELLIOTT, F. F. (1437)
ECONOMIC IMPLICATIONS OF THE AGRICULTURAL CONSERVATION PROGRAM. Jour. Farm. Econ. 19: 13-27. February 1937.
Paper read at the twenty-seventh annual meeting of the American Farm Economic Association, Chicago, Ill., December 28, 1936. Discusses the purposes and points of view in conservation; alternate methods of attaining a desirable conservation and adjustment program for agriculture; and the adequacy of the present Soil Conservation Act for attaining such a program.

ELY, R. T.

(1438)

SOIL DETERIORATION AND PUBLIC LAND POLICY. Amer. Soc. Agron. Jour. 18: 161-165. February 1926.

An economic survey of our lands is advocated to determine whether they are suitable only for forests; the planting of this land to forests and making it more or less the property of the State or Nation; a policy of tenant remuneration for unexhausted fertilizers and improvements; the education of both owner and tenant to the problem of soil improvement; and a policy for the disposal of city sewage other than by pollution of streams and lakes.

ETHERIDGE, W. C.

(1439)

GOOD USE OF FARM LAND IN MISSOURI. Mo. Agr. Col. Ext. Cir. 332, 8 pp., illus. 1935.

Procedures for competitive farming through adoption of new ideas are outlined with suggestions for increased use of Korean lespedeza and winter barley. New factors reducing farming costs through annual double cropping with 1-year rotations are described.

GARD, W.

(1440)

AMERICA'S DESOLATE ACRES. Current Hist. 42: 259-264. June 1935.

The farmers of the Central States realize too late that the soil so hastily mined should have been husbanded. The dust storms are the result of reckless exploitation. The present problem is to take out of cultivation land which can be farmed only at a loss. Land conservation and reforestation had been begun in several States before the New Deal Administration. New York in 1931 ratified a State constitutional amendment for appropriation of \$19,000,000 for a program of reforestation. The various steps taken by this administration for conservation of land resources are cited and discussed. The writer concludes by asserting that, in general, land economists have good reason to be hopeful.

GOODRICH, C. L.

(1441)

FACTORS THAT MAKE FOR SUCCESS IN FARMING IN THE SOUTH. U. S. Dept. Agr. Farmers' Bull. 1121, 30 pp., illus. 1920.

"This bulletin is designed to present, by pictures, charts, and brief text, some of the more important and fundamental factors that make for success on the southern farm. The object is to arouse the interest of the farmer in these factors, so essential to success, and induce him to inquire further into the matter, with the idea of improving his own practice and management."

GOODRICH, CARTER, AND OTHERS.

(1442)

MIGRATION AND ECONOMIC OPPORTUNITY; THE REPORT OF THE STUDY OF POPULATION REDISTRIBUTION. 763 pp. Philadelphia, Univ. Penn. Press; London, H. Milford, Oxford Univ. Press. 1936.

Under chapter V entitled, "The Great Plains", by C. W. Thornthwaite, the following topics are discussed: The physical site; history of settlement including mention of the advancing frontier, dry farming and agricultural mechanization; climatic hazards and crop production, including rainfall records, shifting climatic boundaries; economic implications of crop production, including the influence of climate on crops, income from wheat production in the Great Plains, and agricultural over-expansion and wind erosion. The chapter is concluded with a discussion of population prospects in the Great Plains.

GRAY, L. C., AND OTHERS.

(1443)

UTILIZATION OF OUR LANDS FOR CROPS, PASTURE AND FORESTS. U. S. Dept. Agr. Yearbook 1923: 415-506, illus. 1924.

The object of this article "... is to consider our present situation and future outlook in regard to our resources available for growing the food and raw materials that must be supplied by our crop lands, pastures, and forests." It summarizes American land resources and gives an estimate of future requirements.

HAMLIN, SCOVILLE.

(1444)

THE MENACE OF OVER PRODUCTION; ITS CAUSE, EXTENT, AND CURE. 202 pp.
New York, John Wiley & Sons. 1930.

"This book is extraordinarily timely. It gives us first the facts as to the extent of overproduction—defined primarily as plant capacity in excess of market demands—in many fields, competently summarized by experts. Secondly, it gives us many valuable hints and suggestions for constructive action . . . We receive not one student's view . . . but the composite view of many able specialists, each dealing with that aspect of industry which he knows as he knows his own profit and loss account. The result is unity in diversity."—Foreword.

Chs. 7 and 8: Overproduction in Agriculture, by O. E. Baker, and Land Wastage encourages overproduction, by J. G. Lipman. Ch. 19: Constructive Proposals of Contributors Summarized.

HAMMAR, C. H.

(1445)

AN APPROACH TO THE GRADING OF LAND FOR PURPOSES OF APPRAISAL. Jour. Farm Econ. 18: 523-532, illus. August 1936.

The author discusses a system of classification based on a study of the unit soil factors which affect plant growth and mentions the necessity for also taking into account the stability of the grading, a factor which is influenced by deterioration of the land due to erosion.

HARROWER, D. C.

(1446)

LOSSES IN WASTAGE; NATION'S FARM LANDS BEING DESTROYED BY EROSION. Barron's 14: 3, 6, illus. November 12, 1934.

The national menace of soil erosion is viewed from various angles. "This is not a matter for the farmers alone, nor for the investors who hold mortgages on the land for, as life is dependent upon the soil and values are based upon it, there could be no threat to our national life so great as this."

HOPKINS, J. A., AND GOODSELL, W. D.

(1447)

PRACTICES ON IOWA FARMS. Iowa Agr. Expt. Sta. Bull. 360, 52 pp., illus. 1937.

"The actual experiences of some 400 farm operators, as shown by questionnaires obtained from these farmers in 1934 . . . form the basis for this economic study of farm practices." Table 10, page 42, indicates variations in soil-management practices, including use of lime, sod strips, legumes, green-manure crops, and commercial fertilizers. The number of farms on which soil erosion is a problem is also indicated.

HOWARD, I. M.

(1448)

A CHALLENGE TO WIND AND RAIN. Okla. State Jour. pp. 21, 24, illus. December 1936.

In western Oklahoma wind and rain have stripped the fertile topsoil from hundreds of thousands of acres of once productive farm land. Demonstration erosion-control projects have been established in response to demands for them, and farmers are quick to offer their cooperation. Work on individual farms is described.

HOWE, E. J.

(1449)

THE MORTGAGE IS DUE. Calif. Cult. 83: 685, 705. September 26, 1936.

The writer quotes as follows from the Encyclopedia of Social Sciences: "During the 1850's and 1860's there passed into the hands of western railroad promoters and builders a total of 158,293,000 acres of land . . . The quick transfer of land from public to private hands, and . . . the extension of transportation facilities, was accompanied by extensive new settlement and a rapid rise in land selling prices." The writer contends that "it was during this period . . . that we mortgaged our greatest natural resource, our agricultural lands. That mortgage is now past due." American agriculture is speculative. The reorganization of farm production from a specialty-crop basis to a diversified basis, and farming practices that will conserve present resources are advocated as a means to start payment on the mortgage.

JONES, P. B.

(1450)

AN ECONOMIC STUDY OF LAND UTILIZATION IN TIOGA COUNTY, NEW YORK. N. Y. Agr. Col. (Cornell) Ext. Bull. 648, 40 pp., illus. 1936.

The history of agriculture, types of farming, classification, topography, and reforestation are among the subjects covered.

KEILMOLZ, F. J., ED.

(1451)

A YEAR'S PROGRESS IN SOLVING FARM PROBLEMS OF ILLINOIS. Ill. Agr. Expt. Sta. Ann. Rept. 1935, 331 pp., illus. 1936.

Soils and crops, pages 13-72. Mention is made of the need for information on planning erosion-control measures in Illinois. "One form of information that is almost entirely lacking is that relating to the capacities of different soils to absorb and hold water."

KESTER, HOWARD.

(1452)

REVOLT AMONG THE SHARECROPPERS. 98 pp., illus. New York, Covici Friede. 1936.

"The purpose of this small volume is three-fold. First, to describe a general condition; secondly, to set down the labors of a particular organization [the Southern Tenant Farmers' Union] working in the midst of these conditions; and thirdly, to suggest a way out." It is concerned mainly with conditions in Arkansas. The author suggests that all titles to land be vested in the citizens of the United States. To achieve this a national land authority would be established having the power of eminent domain with the right to purchase land at a fixed sum arrived at by land experts of the authority. It would plan the entire agricultural program of the Nation and mobilize the necessary forces for its execution. The author recommends cooperative farming on a large scale in preference to establishing small independent farmers on land which they will buy over a period of years.

LANDIS, P. H.

(1453)

PROBABLE SOCIAL EFFECTS OF PURCHASING SUBMARGINAL LAND IN THE GREAT PLAINS. Jour. Farm Econ. 17: 513-521. August 1935.

Discusses submarginal land purchases from the standpoint of population readjustment, readjustments in local community functions, and social benefits.

LATHAM, B. M.

(1454)

CHANGES IN CROP ORGANIZATION FOR SOIL CONSERVATION IN THE PIEDMONT AREA OF SOUTH CAROLINA. 11 pp. May 1936. [Mimeographed.]

"In setting forth the results of this study, the cropping system employed in 1935, before the farmers entered into cooperative agreements with S. C. S., is compared with the cropping systems devised for 1936. The source of data were cooperative agreements completed prior to November 21, 1935 . . ."

(1455)

THE CORRELATION OF SOIL EROSION AND TAX DELINQUENCY IN THE PIEDMONT AREA OF SOUTH CAROLINA. U. S. Soil Conserv. Serv. SCS-RB-1, 22 pp. July 1936. [Mimeographed.]

"According to a recent survey of specified school districts in the Piedmont counties by the South Carolina Experiment Station, data were secured which indicate that there is a positive and significant correlation between soil erosion and tax delinquency . . . The following counties were studied: Spartanburg, Chester, Cherokee, Pickens, Anderson, Greenwood, Abbeville, York, Union, Oconee, Fairfield, Saluda, and McCormick . . . In this study no attempt has been made to comment on factors other than erosion which influences tax delinquency as here defined . . ."

LEOPOLD, A.

(1456)

CONSERVATION ECONOMICS. Jour. Forestry 32: 537-544. May 1934.

The writer examines current programs for public land acquisition and for regulation of private land practice from the standpoint of the New Deal's expenditures for conservation designed to include repair of damaged land at public expense and suggests prevention rather than cure of misuse.

- LIPMAN, J. G. (1457)
SOIL DECADENCE. 2d Dearborn Conf. Agr. Indus. and Sci. Proc. 1936: 280-285. 1936.
"The major source of losses comprise the removal of crops and their products and of animals and their products. No less important are the losses due to erosion, leaching, burning, and the intensive decomposition of organic matter by microorganism." Economic aspects of these losses are considered.
- LIVINGSTON, L. F. (1458)
AGRICULTURAL ENGINEER FACES THE FARM PROBLEM. Agr. Engin. 17: 10-13. January 1936.
"There is no one in the land today who is not touched in some manner by the 'farm problem' . . . As one voice in this national debate, speaking in the name of several hundred agricultural engineers, it seems to me pertinent to point out that the term 'farm problem' is a misnomer. We have 6,300,000 farms in America. That means we have 6,300,000 specific farm problems; no two farms and no two farm problems are alike." The author advocates more farm cooperation under a sound business-management basis.
- LOXTERKAMP, LEO. (1459)
W. P. A. FIGURES MARCH TOWARD JULY GOAL. Soil Conserv. 1: 9, 13, illus. June 1936.
"Driving steadily toward its July, 1 man-year quota, the Soil Conservation Service today numbers on its rolls nearly 30,000 W. P. A. laborers, most of whom were formerly on relief." The author explains expenditures by the Soil Conservation Service of the emergency relief appropriation.
- MCDERMID, JEFF. (1460)
"GO TO GRASS." Better Crops with Plant Food 19: 3-4, 45-48, illus. February-March 1935.
The author contends that extensive soil surveys reveal a shocking system of private mismanagement and places a serious charge against the men who have been entrusted with the basic wealth of the Nation.
- MCDONALD, ANGUS. (1461)
THE SOIL BUILDER. Soil Conserv. 2: 50-51, 58. September 1936.
The author describes a farm in eastern Oklahoma. The operator of this farm was a pioneer in soil conservation work, and his successful methods are fully shown by his son who worked with him and under his direction.
- MCDOWELL, J. C. (1462)
UNPROFITABLE ACRES. U. S. Dept. Agr. Yearbook 1915: 147-154, illus. 1916.
Records of unprofitable farm land in various States are discussed, and the need for every farmer who owns unprofitable land to make a detailed examination of his farm, acre by acre, is stressed.
- MILES, H. A. (1463)
OKLAHOMA FARMERS' RECOMMENDED ADJUSTMENTS IN THEIR FARM ORGANIZATIONS TO CONSERVE SOIL FERTILITY AND CONTROL EROSION. Okla. Agr. Expt. Sta. Current Farm Econ. 9: 131-135. December 1936.
Inquiry was made of 10,000 Oklahoma farmers in 1936: "How would you organize your farm to conserve soil fertility and control erosion, if you had complete control and were financially able to carry out your plan?" By means of tables the author gives the replies showing indicated potential adjustments in numbers of livestock, by type-of-farming areas, and acreages of a few selected crops and conservation of soil and soil fertility.
- MINNEMAN, P. G., AND HILL, E. B. (1464)
A FARM MANAGEMENT STUDY OF CROP PRODUCTION PRACTICES. Mich. Agr. Expt. Sta.-Special Bull. 241, 58 pp., illus. 1933.
Presents an analysis of the practices followed and the labor, equipment, and materials used in crop and livestock production on some of the more successful farms in southeastern Michigan. Forty-one tables are shown on seedbed planting, harvesting, and fertility practices.

MINNEMAN, P. G., AND HILL, E. B.

(1464)

ORGANIZATION OF FARMS IN SOUTHEASTERN MICHIGAN. Mich Agr. Expt. Sta. Spec. Bull. 254, 51 pp., illus. 1934.

This bulletin shows the organization of some of the more successful farms and the changes that may be made to adjust the individual farm business to the changed economic conditions. "This discussion is concerned with 'what' and 'how much' to produce rather than with 'how' to conduct the various farm operations."

MYERS, W. I.

(1465)

ECONOMIC STUDY OF FARM LAYOUT. N. Y. (Cornell) Agr. Expt. Sta. Mem. 34, pp. 389-563, illus. 1920.

The author explains that the objects of this investigation were (1) to study the principles of farm lay-out and determine their relative importance as an aid to individuals in rearranging their farms to secure the most efficient use of labor and land; (2) to study the utilization of land on the typical farms considered, as a public problem of land utilization, with particular reference to the possibilities of increasing the area of cropland to meet the needs of an increasing population.

(1467)

HOW TO PLAN THE FARM LAYOUT. N. Y. Agr. Col. (Cornell) Ext. Bull. 55, 36 pp. illus. 1935.

The author discusses important factors in planning the farm lay-out and explains why many New York farms need rearranging.

NATIONAL INDUSTRIAL CONFERENCE BOARD.

(1468)

THE AGRICULTURAL PROBLEM IN THE UNITED STATES. 157 pp. 1926.

The development of sound, far-sighted national policies in respect to agriculture is stressed as one of the most important problems before the country today. "In the development of such policies and the determination of such questions it is the duty of all groups to take part." It is pointed out that the primary purpose of the National Industrial Conference Board "is to clarify the problem as a whole so as to contribute to a better and more general understanding of it . . . and so to provide a common basis for such sound policies as may assure the country a prosperous agriculture as a part of a prosperous national economy." Main chapter headings are: The Importance of the Problem; The Economic Position of Agriculture; Factors in Agricultural Income; and Factors in Agricultural Costs.

NELSON, LOWRY.

(1469)

SOIL CONSERVATION AND HUMAN WELFARE. Utah Farmer 57: 3, 11, 21. March 25, 1937.

"The conservation of soil is not alone an economic and a technological problem. In the last analysis, it is a social concern." The author surveys the waste of natural resources of a young and rich country with the consequent devastation through deforestation by timber merchants, floods, and soil erosion.

NELSON, PETER.

(1470)

INFORMATION ON SOIL CONSERVATION. Okla. Agr. Expt. Sta. Current Farm Econ. 10: 13-15. 1937.

The author discusses replies from experiment stations and regional directors to two questions submitted concerning satisfactory systems of soil conservation and the extent of tests made of these systems. "Indications are that physical conservation, that is, prevention of erosion by means of mechanical structures or by means of certain types of plant cover, can be achieved generally. The economics of conservation, on the other hand, is an almost unexplored field."

NICHOLLS, W. D.

(1471)

TWO THOUSAND ACRES OF GRASS. Country Gent. 83: 5, illus. February 2, 1918.

One of the biggest farmers of central Kentucky says it pays to graze high-priced lands. The writer describes in detail the management and working of farms in Bourbon County, Ky., and quotes costs and results to prove the success of the methods used.

O'BRIEN, H. R.

(1472)

SOMETHING NEW IN FARM LEASES. *Country Gent.* 84: 10, 33-34. March 15, 1919.

Discusses farm leases which provide for permanent maintenance of the fertility of the soil. A model farm lease contract drafted in 1918 by L. S. Robertson of the agricultural extension department of Purdue University is given.

OKLAHOMA AGRICULTURAL EXPERIMENT STATION.

(1473)

FARMER-SUGGESTED CHANGES IN FARM ORGANIZATION, BY OKLAHOMA TYPES-OF-FARMING AREAS, FOR PURPOSES OF CONSERVING SOIL FERTILITY AND CONTROLLING EROSION. *Okla. Agr. Expt. Sta. Current Farm Econ.* 9 (6): 127-150. 1936.

A summary of data furnished by 5,346 farmers indicate that if Oklahoma farmers had complete control of their operations and were financially able to carry out policies they believe to be best from the standpoint of maintaining fertility and controlling erosion, they would reduce the acres of small grain and cotton in all major producing areas and for the State as a whole, while acres of hay and feed crops would be increased as well as numbers of livestock.

OLSON, C. R.

(1474)

FARM MANAGEMENT AND EROSION CONTROL. *Stephenson County Farm Monthly* 18: 11. September 1936.

"There is probably no other thing the farmer can do that will pay him as well to follow as a good soil conservation program. Such a program is one of the first requirements of good farm management."

OTIS D. H.

(1475)

FARM WELL PLANNED. *Wis. Agr. Expt. Sta. Bull.* 328, 28 pp. illus. 1921.

Principles of effective field lay-out for the purpose of saving labor, maintaining fertility, and increasing production are set forth. A sketch of farm development in Wisconsin is given.

(1476)

PROTECTION FOR FARM LAND VALUES. *Banking* 28: 22-23, illus. October 1935.

Loans for improved seed labor-saving equipment, quality stock, fertilizers, control of insects and plant and animal diseases, and harvesting and marketing of crops "usually fall in the category of safe and desirable farm loans . . ."

PARKER, E. C.

(1477)

FIELD MANAGEMENT AND CROP ROTATION; PLANNING AND ORGANIZING FARMS; CROP ROTATION SYSTEMS; SOIL AMENDMENT WITH FERTILIZERS; RELATION OF ANIMAL HUSBANDRY TO SOIL PRODUCTIVITY; AND OTHER IMPORTANT FEATURES OF FARM MANAGEMENT. 507 pp., illus. St. Paul, Minn., Webb Pub. Co. 1915.

Agricultural history from early times to the present. Definition and classification of crops with their effects on soil properties, and other important features of farm management are discussed. "American agriculture has already exhausted and wasted large amounts of the Nation's original assets of plant food in the soil. We have reached a stage in the progress and development of our agriculture, where, as a Nation, we must give greater consideration to the problems of maintaining soil productivity and less consideration to the problems of subduing virgin lands. There is no such thing as soil of inexhaustible fertility." A compendium of facts and statistics is given in the appendix.

PETERSON, G. M., AND GALBRAITH, J. K.

(1478)

THE CONCEPT OF MARGINAL LAND. *Jour. Farm Econ.* 14: 295-310. April 1932

"The concepts presented in this paper are admittedly of an abstract and perhaps elusive character. Such, however, is the nature of economic theorizing and so long as it is to form the point of departure for practical work in agricultural economics, it must be given thorough going consideration." Discusses important static and quasi-static factors which determine the grade of land which will mark the position of the margin of cultivation.

PETERSON, V. S.

(1479)

KEEP THE BOARDER ACRES OUT OF YOUR FIELDS. Successful farming 30: 9, 44-45, October 1932.

"An example of how one man is kicking out the boarder acres is found on the farm of Carl Anderson, Washington County, Iowa. He has taken out all unnecessary fence rows, tilled wet and seepy spots, planted trees in large gullies, used various types of dams in smaller ditches, terraced hillsides, and used a wise soil management policy." The author recounts the experiences of other Iowa farmers in saving their soil. Check dams for gully control are emphasized.

POND, G. A., AND CRICKMAN, C. W.

(1480)

PLANNING FARM ORGANIZATION FOR THE NORTHEAST CUT-OVER SECTION OF MINNESOTA. Minn. Agr. Expt. Sta. Bull. 295, 104 pp. illus. 1933.

A study is presented of agriculture in the partially developed counties within the heavy-soils section of the cut-over areas. "In addition to general observations and an interpretation of statistical information periodically available, a detailed study was made of the organization and operation of a group of representative farms in the Askov Community of Pine County. Complete records of the crops and livestock production, the labor, power equipment, and materials used in production, and the financial transactions of each farmer for each year were obtained to serve as a basis for judging the relative desirability of different combinations of crops and livestock under the conditions of this area and for studying the best methods of handling the crop and livestock enterprise in these combinations."

PRESCOTT, C. C.

(1481)

MENACE OF SOIL EROSION. Manfrs'. Rec. 104: 24, illus. August 1935.

"Erosion control must become a vital part of long time planning of land use, if we are to escape the poverty and low economic standards that have befallen older nations on account of destructive acceleration of erosion . . . Our methods and use of the soil will determine the well-being of the present and future standards of living in the land . . . The purpose of the government through the soil erosion service is to help establish a complete well-balanced farm conservation program."

PROCTER, R. E.

(1482)

FARM ACCOUNTS AND BUDGETS AID FARM MANAGEMENT. Ky. Agr. Col. Ext. Cir. 277, 20 pp. 1936.

By means of tables the author shows a complete budget for a 100-acre farm listing kinds and requirements of crop and livestock, together with production and disposal.

QUICK, HERBERT.

(1483)

A CONSPIRACY TO ROB. Country Gent. 89: 15. May 31, 1924.

Relates the evils of the 1-year farm lease and suggests as a remedy a lease" . . . which should enable the good tenant to lay plans years ahead; to build within reason and have a claim for it; to reclaim and terrace and drain where proper. Rent should never be increased to make the tenant pay on values he himself has created."

RAST, L. E.

(1484)

SOIL ROBBING MUST COME TO AN END. South. Cult. 93: 3, 5. January 1, 1935.

This article discusses the damage done and the loss of income to American farmers by soil erosion. Conditions in Georgia are especially considered, the author stating that soil washing and blowing have been major causes of the State's increase in farm mortgages from \$28,000,000 in 1910 to more than \$101,000,000 in 1930. The program of the Soil Erosion Service is outlined.

REED, E. H.

(1485)

FARM MANAGEMENT INFORMATION NEEDED IN FARM PLANNING. Soil Conserv. 2: 260-261, 266. May 1937.

The author suggests that physical, economic, and human factors be considered in farm planning. Since all farms are not identical, it is important to make a study of the individual farm before planning begins.

REED, E. H. and FALCONER, J. I.

(1486)

THE EFFECT OF LAND USE AND MANAGEMENT ON EROSION. Ohio Agr. Expt. Sta. Bull. 585, 19 pp., illus. 1937.

Report based upon a study of 100 farms located in four Soil Conservation Service demonstration-project areas in Ohio.

ROOSEVELT, F. D.

(1487)

SAVE THE SOIL. Wallaces' Farmer 60: 656. November 9, 1935.

Text of a statement made by the President, October 25, 1935. It discusses the two principal objectives of the A. A. A. program which are defined as "... avoiding the danger of a slump back into conditions brought on by our national neglect of agriculture ... [and] to broaden present adjustment operations so as to give farmers increasing incentives for conservation and efficient use of the nation's soil resources." Abandonment of farms because of erosion is described as presenting an economic adjustment problem in the present and a menacing source of food shortage in the future.

ROTH, WALTER J.

(1488)

RESEARCH IN THE ECONOMIC AND RURAL LIFE ASPECTS OF SOIL CONSERVATION. Soil Conserv. 1: 9-11. April 1936.

"The objective is to provide sound economic and social research for the activities of the Soil Conservation Service... the studies will be concerned with both individual farms and with groups of farms."

ROUSE, W. L., AND OTHERS.

(1489)

FARM ORGANIZATION AND MANAGEMENT IN GRAYSON COUNTY. Ky. Agr. Expt. Sta. Bull. 317: 164-215. 1931.

The purpose of this study, made in the summer of 1929, was "to obtain basic information on the present organization and management of the farms and to determine the factors that control the farmer's income. The study is an attempt to determine how those farmers who made the larger incomes did so. The survey method of collecting the information was used. Records were obtained from 254 operators for the year 1928... The area was laid out so that the farms are representative for the county."

SAVILLE, R. J.

(1490)

AGRICULTURAL PLANNING AND FARM MANAGEMENT IN THE COTTON BELT. Jour. Farm Econ. 17: 539-546. August 1935.

"Planning implies guiding economic and social forces in such a manner that adjustments may be facilitated in the dynamic changes inevitable in normal growth... The final test of plans for immediate agricultural recovery and for the transition to a permanent program must not be confined entirely to farmers, but must embrace the entire population comprising the cotton belt."

SCHICKELE, RAINER.

(1491)

ECONOMIC IMPLICATIONS OF EROSION CONTROL IN THE CORN BELT. Jour. Farm Econ. 17: 433-448. August 1935.

Various signs are pointed out indicating that the United States is manifesting the end of the colonization era and entering the phase of socioeconomic maturity. "Erosion control is an important phase of the general policy of conservation evolving out of this maturing process... Society can no longer afford to leave unchecked the rapid dissipation of the soil's producing power. Erosion control has become a public issue." Economic and social factors affecting soil conservation are listed.

HIMMEL, JOHN P., and HURD, R. M.

(1492)

ECONOMIC PHASES OF EROSION CONTROL IN SOUTHERN IOWA AND NORTHERN MISSOURI. Iowa Agr. Expt. Sta. Bull. 333, 48 pp. 1935.

"The following are the principal economic and social factors which, in general, tend to hinder or assist erosion control: Small farms; corn-hog type of farming; farms operated by tenants; heavy debt burden and high interest rates; large farms; dairy and beef cattle type of farming; farms operated by owners; small debt burden and low interest rates. This bulletin attempts to show how these and other factors are related to erosion control."

SCOATES, D.

(1493)

SOIL CONSERVATION AND THE BANKER. Jour. Amer. Bankers' Assoc. 22: 197-198. September 1929.

Soil erosion is pictured as wastage of valuable collateral. "Water sometimes washes away mortgages as well as farms and banks are left with worthless lands." The author offers a concrete illustration of what banks can do to insure adequate protection for the soil of farms upon which they lend money and discusses terracing as the best protection.

SHALER, N. S.

(1494)

ECONOMIC ASPECTS OF SOIL EROSION. Natl. Geogr. Mag. 7: 328-338, 368-377. 1896.

The author states that he proposes "to take the processes of land erosion from the point of view of the geologist, and to trace the influence of their actions upon the formation and preservation of the soil. In the treatment of this subject we shall be led into that important but as yet unrecognized branch of national economy which relates to the preservation of the tillage values of various countries." A brief comparison between forest and grass cover under heavy rainfall is made. The need for normal forest growth is stressed, and the irreparable damage done by deforestation in Europe is cited. In highland districts the process of erosion is the most rapid and the results are the most irremediable. Economical and careful systems of tillage are advocated, also that "all areas having a slope of more than fifteen feet in one hundred should, by the rules which the conservator of the soils is disposed to lay down, be devoted to forests . . ." Primary education in soil conservation is urged.

SLATER, ROBERT M.

(1495)

AN AGRONOMIST LOOKS AT LAND USE. Jour. Amer. Soc. Agron. 28: 959-967. December 1936.

Presidential address delivered before the twenty-ninth meeting of the American Society of Agronomy, Washington, D. C., November 19, 1936. Proposes attacking land use via the individual farm and comments on the opportunities and responsibilities of agronomists in land-use affairs.

STAPLEDON, R. G.

(1496)

THE IMPROVEMENT OF HILL LAND. Scot. Jour. Agr. 19: 14-24. January 1936.

In his conclusion the author states: "It is early days to be dogmatic regarding the methods of improving hill land; detailed experiments were only started by the Welsh Plant Breeding Station in 1931 . . . Land Improvement in all its aspects is a long range undertaking and demands facilities and organization. Without regional investigation and organization we are not likely to see the long overdue revolution in the farming and management of hill land . . ."

TAYLOR, E. H.

(1497)

WHO TAKES THE RAP? Country Gent. 106: 14. 91-92, illus. April 1936.

Various economists on the subject of increased production of grass with special reference to surplus production in livestock and dairy industries are quoted. The conclusion is reached that the soil conservation and land-use program should be slowly and carefully developed, with the following important considerations: (1) The landowner himself, whose direct interest is to preserve land fertility; (2) the State or local community with need for taxable wealth in the form of fertile farm lands; (3) the National Government whose duty it is to render guidance and assistance to the man on the land, the State, or local community.

TEXAS AGRICULTURAL AND MECHANICAL COLLEGE EXTENSION SERVICE.

(1498)

PLANNING TEXAS FARMING, 1932. Tex. Agr. Col. Ext. Cir. 89, 8 pp. 1932.

Suggestions to be considered in farm planning are made under such headings as: Selling the Farm Home Market First; Producing a Small Surplus of Food to Sell; Using Care before Planting New Cash Crops; Planting Feed to Sell Through Livestock; Cutting Cost of Production to the Limit; Raising Prices by Producing Quality Goods; Preserving the Land by Terracing and Wise Utilization; and No Two Farms are Alike.

- THOMAS, H. L. (1499)
 PLANNING A CROP ROTATION IN CONNECTION WITH STRIP CROPPING. U. S. Soil Conserv. 1: 4-5. March 1936.
 The author outlines and illustrates by a map an erosion-control program on a Caledonia, Minn., farm.
- TYLER, H. S. (1500)
 AN ECONOMIC STUDY OF LAND UTILIZATION IN CHENANGO COUNTY, NEW YORK. N. Y. (Cornell) Agr. Expt. Sta. Bull. 654, 63 pp., illus. 1936.
 This bulletin includes information on the agricultural history of the county, gross income on farms, land classification and use, soils in State reforestation areas, and adaptation of soils used for the production of special crops.
- UNITED STATES BUREAU OF AGRICULTURAL ECONOMICS. (1501)
 LOOKING AHEAD ON AGRICULTURAL POLICY. AN APPRAISAL OF ECONOMIC AND SOCIAL FACTORS BEARING ON AGRICULTURAL ADJUSTMENTS. U. S. Bur. Agr. Econ. 20 pp., illus. Washington, D. C. 1936. [Mimeographed.]
 Prepared by a committee of representatives of the Bureau of Agricultural Economics, the Agricultural Adjustment Administration, the Soil Conservation Service, and the Resettlement Administration. Soil conservation and land utilization, pages 12-14.
- UNITED STATES SOIL CONSERVATION SERVICE. (1502)
 THE SOIL CONSERVATION SERVICE. U. S. Soil Conserv. Serv. News, February 1937. pp. 1-12, illus. 1937.
 The aims of the Soil Conservation Service are discussed, and to illustrate the procedure involved, the steps in making and completing an actual farm plan are described.
- VASS, A. F. (1503)
 AGRICULTURAL PLANNING AND FARM MANAGEMENT IN THE RANGE TERRITORY. Jour. Farm Econ. 17: 553-561. August 1935.
 Five major phases of endeavor relating to the range territory are cited: (1) Reduction and adjustment of crops; (2) cattle- and sheep-buying programs; (3) the taking over by the Federal Government of privately owned and unappropriated lands; (4) the new Farm Credit Administration functions; and (5) developing storage reservoirs for power, irrigation, and flood-control purposes.
- VICKERS, F. G. (1504)
 FARM INVESTMENTS SLIPPING? Prog. Farmer (Ky.-Tenn. Ed.) 52: 11, illus. February 1937.
 Account of how eastern Tennessee farmers have realized that their land is slipping. Methods to remedy the situation are given.
- VISHER, STEPHEN S. (1505)
 CONTRASTS BETWEEN THE TWELVE RICHEST AND POOREST INDIANA COUNTIES. Ind. Acad. Sci. Proc. 40: 247-250, illus. 1931.
 "By considering a large number of criteria, it is possible to determine which counties are poorest in most significant respects, and which richest. The data presented by counties in the recent official summary of census data and . . . The Market Data Handbook of the United States, U. S. Dept. of Commerce 1929, have been of great service in this respect . . . The following is a summary of some of the more distinctive of these criteria as they apply to the twelve counties considered to be richest and the twelve poorest."
- WAKELEY, R. E. (1506)
 SOCIAL AND ECONOMIC EFFECTS OF SOIL EROSION. Rural Sociol. 1: 509-510. December 1936.
 The author mentions briefly studies under way at Iowa State College to determine the social and economic effects of soil erosion. "Though true, it is not enough to say that soil erosion causes social disorganization."

WARREN, G. F.

(1507)

FARM MANAGEMENT. 590 pp., illus. New York. 1914.

This book is the study of the business principles in farming. "It may be defined as the science of the organization and management of a farm enterprise for the purpose of securing the greatest continuous profit . . . The conclusions in this book are based on investigations . . . on cost accounts, census data, travel and study in different parts of the United States and experience in farming." Chapter 14 deals with cropping systems, and chapter 18 considers the choice of a region with reference to climate (rainfall, evaporation, winds, etc.) and fertility of the soil. The use of soil-maps is advocated.

EDUCATIONAL PHASES OF SOIL CONSERVATION

ANONYMOUS.

(1508)

CONSERVATION IN LITERATURE. HOW SOME GREAT WRITERS HAVE LOOKED AT THIS UNIVERSAL PROBLEM. Scholastic 29:9. September 26, 1936.

Quotes from Uncle Vanya, by Anton Chekov; Bambi, by Felix Salten; Green Hills of Africa, by Ernest Hemingway; Sticks and Stones, by Lewis Mumford.

(1509)

EMERGENCY CONSERVATION WORK. Libr. Jour. 59: 120-121. February 1, 1934.

"A new and far-reaching educational program for the 300,000 men of the Civilian Conservation Corps has been approved by President Roosevelt and will go into effect at once . . . The purpose of the program is to give every young man and veteran in the 1,466 camps a chance to improve his education and to enhance his prospects for securing permanent employment." This educational program is described in full.

(1510)

HOW GOES THE BATTLE? Ariz. Teacher 24: 36-38, illus. October 1936.

"Note: This paper on Geology and Soil Formation, prepared for Navajo Indian high school students, is an unusual example of how a highly technical subject may be presented in interesting and simple terms." Indian folklore is adapted to modern conditions and soil erosion.

(1511)

REPORT OF COMMITTEE ON SOIL CONSERVATION. (Editorial.) Trop. Agr. [Ceylon] 76: 261-262. May 1931.

"The Committee has taken what seems to many to be very optimistic ideas of the powers of education. It thinks that educative methods should be tried for a period of five or seven years before compulsion by legislation should be considered." The author doubts the success of these methods as "soil erosion is often the result of the encouragement of hoped-for sordid gain . . . The greatest assistance should come from Planters' Associations if they would constitute themselves as vigilance committees and call the attention of any erring members to soil erosion on their lands. The Report is circulated to all field officers of the Agricultural Department and their attention called to the necessity to do what they can to educate and direct the small holder along lines of soil-conservation."

(1512)

WORKING EROSION MODEL TO ILLUSTRATE THE INFLUENCE OF VEGETATION IN CHECKING EROSION. Sci. Amer. Sup. 77: 291-293, illus. May 9, 1914.

The essential features of this model, showing the processes of erosion on deforested slopes, are described.

ALLISON, I. S.

(1513)

NEW EROSIONAL TERMS. Amer. Jour. Sci. (5) 16 (4): 360. 1928.

The writer comments on an article by Glock (1533) and points out certain hybrids in common use which lend themselves to misinterpretation. He says: "Terms intended for technical use by advanced students and specialists should be no less clear than those intended for general use."

- BEAR, F. E. (1514)
SOIL MANAGEMENT. 268 pp., illus. John Wiley & Sons, Inc., New York and London. 1924.

The purpose of this book is primarily that of acquainting the student with the applications of those scientific facts and principles which are of use in planning constructive systems of soil management and in increasing the productive capacities of soils." The table of contents includes the following: Requirements of Crops; Characteristics of Soils; Utilizing Soil Resources; Conserving Soil Resources; and Supplementing Soil Resources. "The extent to which the surface soil is removed is determined by the character of the soil, the frequency with which cultivated crops are grown, the climatic conditions and the slope of the land . . . It is possible to take advantage of certain means of conservation by which the soil can be largely held in place and at the same time have its mineral content gradually renewed from the subsoil. It cannot be said, however, that losses by drainage and erosion are always objectionable, in fact quite the opposite is often true . . ."

- BENNETT, H. H. (1515)
SOIL EROSION AND FLOOD CONTROL. 3 lectures before Graduate School of the U. S. Dept. Agr. 1928. U. S. Soil Conserv. Serv. SCS-TP-7, 26 pp. [Mimeographed.]

In these three lectures the soil erosion and flood control problem is discussed from a national viewpoint. The first presents important data on erosional wastage and discusses the work of several experiment stations. The results of some measurements relating to the Mississippi River and its tributaries are given; the second is a discussion of soil types; and the third defines various types of soil erosion.

- (1516)
SOIL EROSION—MINUTES OF ANNUAL MEETING OF AMERICAN SOCIETY OF AGRONOMY. Jour. Amer. Soc. Agron. 24: 1006-1009. December 1932.

"It has been suggested that we stress the educational phases of erosion work." An outline of new lines of research is discussed, including the various phases pertaining to the national program of soil conservation through published reports, lectures given to State vocational teachers, followed by lectures by agricultural engineers with field instruction in the actual building of terraces. "Pertinent results are coming in rapidly—fundamental results of vital importance to a clear understanding of erosion processes, extent and geographical distribution of land damage by erosion and methods of control. Unmistakable evidence is piling up to the effect that the original plan for carrying out the erosion research program on a regional basis was the proper course to pursue." A number of basic findings are presented.

- BISSELL, M. H. (1517)
ON THE USE OF THE TERMS "DENUDATION," "EROSION," "CORROSION," AND "CORRASION." Science 53: 412-414. 1921.

- BRISTOW, W. H., and COOK, K. M. (1518)
CONSERVATION IN THE EDUCATION PROGRAM. U. S. Off. Ed. Bull. 1937, No. 4, 78 pp. Washington, Govt. Print. Off. 1937. Bibliography, pp. 71-78. Not examined.

- BURGES, A. E. (1519)
SOIL EROSION CONTROL—A PRACTICAL EXPOSITION OF THE NEW SCIENCE OF SOIL CONSERVATION FOR STUDENTS, FARMERS, AND THE GENERAL PUBLIC. 187 pp., illus. Atlanta, Ga., Turner E. Smith & Co. 1936.

"Not until now has there been available to the public any book in which the bewildering mass of erosion data has been reduced to its essentials. This volume presents erosion control as an organized whole." Suggestions for field practice follow each chapter. Glossary of terms, pages 181-184.

- BYRD, S. (1520)
DEMONSTRATION OF FORESTRY EROSION PROCESSES. Sci. Amer. 107: 555, 560. December 28, 1912.

"Experts of the government have been successful in the construction of a striking working model showing the processes of erosion on deforested

slopes." The model is for the use of pupils in public schools who are taking courses in nature study, elementary agriculture, and physical geography.

CLEMSON AGRICULTURAL COLLEGE.

(1521)

PLANNING A CONSERVATION PROGRAM FOR AN INDIVIDUAL FARM. Clemson Agr. Col. Agr. Ed. 13: 31 pp., illus. September-October 1936.

"These are non-technical issues of Agricultural Education devoted to procedures and practices for use in planning conservation programs on individual farms. These practices have been established through research and observations by the Soil Conservation Service . . . The facts and procedures set forth . . . are highly important in appraising and selecting a farm . . . These issues of Agricultural Education should prove very useful in teaching part-time and evening class students as well as all-day students in the high schools."

(1522)

RESULTS OF EROSION. Clemson Agr. Col. Agr. Ed. 12: 81-140, illus. February-May 1936.

"Much experiment station data are printed in this issue of Agricultural Education in order that the farmer and farm boy may associate genuine meanings in terms of farming with the different classes of erosion found on individual farms." Among the contents are description of a soil profile; description and symbols of classes of erosion; some of the more important results of erosion, and effects of erosion on an individual farm.

COLEMAN, O. T., AND MARTIN, T. T.

(1523)

4-H SOIL CONSERVATION I CLUB. Mo. Agr. Col. Ext. (4-H) Cir. 1935, 30 pp. 1935.

The object of project 1 as stated is to organize rural boys and girls into groups for the purpose of impressing them with the seriousness of soil-erosion and soil-fertility losses and instructing them in recommended methods for reducing such losses in the future.

COPELAND, J. T.

(1524)

BOYS' 4-H TERRACING CLUB. Miss. State Col. Agr. Ext. Bull. 51, 11 pp., illus. 1931.

The purpose of the project discussed in this bulletin is to aid boys in gaining lessons from nature. Symptoms of erosion and erosion losses are described and practical instructions for terrace building given.

COPLEN, R. I.

(1525)

COUNTY TERRACING PROGRAM. U. S. Ext. Serv. Rev. 3: 58. April 1932.

A terracing school in Lafayette County, Mo., and its development is described.

CORNELL UNIVERSITY, COLLEGE OF AGRICULTURE.

(1526)

SAVE THE SOIL. Cornell Rural School Leaflet 29(4): 32 pp., illus. 1936.

This leaflet was prepared to help young people better to understand Federal and State programs to conserve the resources of our soil. A suggested list of erosion-control plants, native or hardy, in New York State, which produce food or shelter for wildlife is included.

DAVIS, K. C., ED.

(1527)

SOUTHERN FIELD-CROP ENTERPRISES INCLUDING SOIL MANAGEMENT. 574 pp., illus. Chicago, J. P. Lippincott Co. [1937.]

"A revised edition of a book prepared several years ago for vocational teachers of the southern region. Each of the twenty-one enterprises included are treated by specialists in the particular field. New sections on soil have been added. These are entitled: (1) Soils and other plant relationships; (2) Conservation and improvement of soils; (3) Land drainage; (4) Preventing soil erosion—terracing. The soil treatments in all sections of the book have been revised and improved, including suggested rotations, cover crops, green manure, culture, tillage, and soil management for the special crops and regions."

DREIER, JOHN.

(1528)

EDUCATION IN AREA LAND USE PLANNING. A RÉSUMÉ OF SOME EDUCATIONAL ACTIVITIES IN THE REGIONAL RESETTLEMENT ADMINISTRATION AT AMARILLO, TEXAS. U. S. Resettlement Admin. Land Policy Cir. 3: 17-24. May 1937.

Local problems were discussed with local people, and their suggestions for improvement and change were weighed. "The outcome was a series of policies and suggested programs which represent the joint work of technical personnel and the practical land operators of the country." The writer concludes: "In a brief summary of the educational work as given here, it is impossible to indicate all the factors of importance which entered into the work . . . Education, particularly democratic education, consists not of pouring things into people's heads, but of developing their own constructive thinking abilities to the point where they can make some original contribution to human progress."

ELLIS, D. C.

(1529)

A WORKING EROSION MODEL FOR SCHOOLS. U. S. Off. Expt. Sta. Cir. 117, 11 pp. July-December 1912.

"A description is given of a model designed to illustrate graphically the erosion of hillsides and the destruction of farms in the lower valleys following the complete removal of forests from the hills."—Expt. Sta. Rec. 27: 797. 1912.

FAIRBANK, J. P.

(1530)

PREPARATION AND PRESENTATION OF EXTENSION SUBJECT MATTER. Agr. Engin. 17: 331. August 1936.

Because "many farmers and mechanics are born experimenters and have a wealth of information gained from experience with their local conditions", the author maintains that the extension engineer would do well to cultivate their acquaintance.

FISHER, F. A.

(1531)

WHAT AMERICA'S SOIL CONSERVATION PROGRAM REQUIRES OF THE ENGINEER. Agr. Engin. 17: 45-46, 54, illus. February 1936.

The need for agricultural engineers having the proper viewpoint and training for the Soil Conservation Service is stressed. In both agricultural and engineering colleges a combination of courses, including "ample training in soils and crops, farm management, structural design, surveying, hydraulics, and the construction and operation of farm and certain types of heavy machinery" should be offered.

GAINES, S. H., COMPILER.

(1532)

GLOSSARY OF TERMS USED IN SOIL CONSERVATION. U. S. Soil Conserv. Serv. SCS-MP-15, 146 pp. October 1936. [Mimeographed.]

"This glossary . . . is designed to serve as a nucleus for bringing about an accurate exchange of thought and ultimately to establish a vernacular for the soil conservationist. The terms in this collection, for the most part, are those which have not had sufficient use in any one branch of agriculture to warrant compilation in glossary form."

GLOCK, W. S.

(1533)

ANALYSIS OF EROSIONAL TERMS. Amer. Jour. Sci. (5) 15 (90): 471-483. 1928.

The author explains the need of certain terminology for clarity and precision and from voluminous literature sifts current usage pertaining to soil erosion. He believes the alteration of accepted root words should be discouraged.

GODLEY, LLOYD.

(1534)

COUNTY WIDE SOIL EROSION CAMPAIGN. Okla. Ext. News 13: 1, illus. January 1932.

Description is given of measures used in soil-erosion control by progressive farmers and Payne County's five terracing schools.

GREGORY, J. W.

(1535)

THE TERMS "DENUDATION", "EROSION", "CORROSION", AND "CORRASION". Geogr. Jour. 37: 189-195. February 1911.

- GREGORY, M. H. (1536)
CHECKING THE WASTE: A STUDY IN CONSERVATION. 318 pp. Indianapolis, Bobbs-Merrill Co. 1911.

This book was designed as a short but complete statement of the entire conservation question that might serve for study in "teachers' reading circles, farmers' institutes, women's clubs, the advanced grades in schools, and for general library purposes. Every statement of fact bears the weight of authority, for no facts or figures are given that have not been verified by government reports, reports of scientific societies, etc."

- HEIBERG, S. O. (1537)
NOMENCLATURE OF FOREST HUMUS LAYERS. Jour. Forestry 35: 36-39. January 1937.

The author finds "in current American forestry literature such terms as raw humus, peat, upland peat, acid humus, torf, duff, and mor, all used for the type of humus layer where the organic matter is unincorporated in the soil proper." The need for standardized terminology of forest humus layers is pointed out.

- HOWE, F. B. (1538)
SUMMER WORK IN EROSION CONTROL. Cornell Countryman 32: 92. June 1935.

"An attractive opportunity is offered a few students in the College of Agriculture, to spend the summer in actual field work . . . against the menace of soil erosion . . . They will be allowed to enroll in CCC camps which are now under the direct supervision of the Soil Conservation Service."

- HUTCHESON, T. B. (1539)
SOIL EROSION STUDIES. Assoc. South. Agr. Workers Proc. 29: 69-70. 1923.

The writer tries to emphasize the most serious problem of the southern farmer—soil erosion. He stresses the need for educational work in this direction and describes the processes of erosion going on in the Piedmont area and experimental work being done in erosion control at the Virginia Agricultural Experiment Station.

- KARRAKER, P. E. (1540)
SOIL WASHING. Ky. Agr. Ext. Cir. 54: 29-31. 1927. (4th ed.)

"This circular presents in simple form important features of proper soil management and principles underlying the maintenance and building up of the productivity of soils in Kentucky. Attention is directed to important methods and ways of treating and handling land in Kentucky which, when put into practice, very much increase crop production and largely contribute to a more prosperous and satisfactory agriculture. The subject of soils is not treated in an inclusive way and readers desiring additional information are referred to other sources. The questions at the end of each chapter may be of service when the circular is used as a study course."

- KINGSTON, A. C. (1541)
SOIL CONSERVATION MEANS SOIL FERTILITY. Amer. Bankers' Assoc. Agr. Conn. Bull. 10: 1, illus. August 1936.

"Bankers can be of great assistance in the soil conservation project by helping promote educational work to bring about more constant thought among farmers as to the importance of this activity."

- LORD, RUSSELL. (1542)
MEN OF EARTH. 288 pp. New York, Longmans Green & Co. 1931.

A study and analysis of the attitudes and opinions of various American farmers. Observations are made on wheat and corn growing, cattle raising, goats, dairy products, and the marketing of farm products.

- MACKENZIE, A. J. (1543)
ECONOMIC ASPECT OF CROP ROTATION. Farming in So. Africa 9: 27-28. January 1934.

The economic advantages of a crop rotation system, as compared with continuous cropping has been demonstrated by the Glen School of Agriculture and on a farm in the Ladybrand district. Results of experiments are discussed.

- MARTIN, G. E. (1544)
 CONTROL OF EROSION IN OKLAHOMA. Agr. Engin. 10: 190. June 1929.
 Early attempts at erosion control in Oklahoma are described. Schemes to promote terracing were successful in the South, and "we are attempting to maintain the work in the northern part of the State on an educational basis." Schools of instruction in erosion control for both adults and children are proving of value in the Extension Service work.
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- OUTLINE OF 4-H FARM ENGINEERING; TERRACING CLUB ACTIVITIES. Okla. Agr. Col. Ext. Cir. 264, 4 pp. 1929. (1545)
 "4-H Terracing Club work is intended to familiarize as many as possible of our young farmers with soil conservation and improvement practices . . . The success of erosion control and moisture conservation work depends upon individual ability in planning, constructing and maintaining effective terracing systems upon the farms of Oklahoma."
- MOSIER, J. G., AND GUSTAFSON, A. F. (1546)
 SOIL PHYSICS AND MANAGEMENT. 442 pp., illus. Philadelphia, J. B. Lippincott. 1917.
 "This book is written for three purposes: first, as a text-book for agricultural students; second, as a reference book for the practical farmer; and third, as an aid to the land owner who desires information in the personal management of his land." Moisture control is treated in chapters 18-21, and soil erosion in chapter 27.
- MYER, D. S. (1547)
 REDEEMING THE GOOD EARTH. U. S. Ext. Serv. Rev. 7: 33, 46, illus. March 1936.
 The author points out that the county agent performs much of the educational work essential to the soil conservation program. He is called upon to guide the farmer's interest to soil conservation, to acquaint the farmer with the erosion-control demonstrations, and to urge adoption of recommended measures.
- OKLAHOMA AGRICULTURAL EXPERIMENT STATION. (1548)
 FARMERS' NEED FOR AN EXPERIMENT STATION. Okla. Agr. Expt. Sta. Rept. 1926-30: 5-8. 1930.
 Advocates higher standards of living for farmers. "Agricultural education is important. Training must include the science as well as the art of farming . . . Net loss in the State of Oklahoma from soil erosion alone is probably over \$100,000,000 annually . . ."
- PAXON, FREDERIC LOGAN. (1549)
 HISTORY OF THE AMERICAN FRONTIER, 1763-1893. 598 pp. New York, Houghton, Mifflin Co. 1924.
 Chapters 34 to 59 cover the exploration, development, and settlement of the Great Plains.
- PHAGAN, C. V. (1550)
 FOUR-H AGRICULTURAL ENGINEERING MANUAL; TERRACING, POND BUILDING, PROFILE LEVELING. Okla. Agr. Col. Ext. Cir. 279, 8 pp. 1935.
 This circular gives building instructions to members of the 4-H Club. "Club members who have a mathematical or engineering turn of mind will find profile leveling one of the most interesting phases of agricultural engineering club work. Some knowledge of profile work is necessary in the solution of many erosion and drainage problems."
- PORTER, J. A. (1551)
 SOIL CONSERVATION FOR 4-H CLUBS. Mich. Agr. Col. Ext. Club Bull. 33, 32 pp., illus. 1937.
 The 4-H soil conservation project is offered to the youth of Michigan so that they may study for themselves the numerous problems that occur in connection with soil conservation. "Soil conservation means saving and maintaining the present fertility of our soil, thereby leaving something for the future."

POWERS, W. L.

(1552)

A FIRST COURSE IN SOIL EROSION. The Land, Today and Tomorrow 2: 25-27, illus. April 1935.

"In response to an increasing demand for instruction in soil erosion control, one of the first college courses treating of the subject as an entity was offered at Oregon State College during the 1934-35 winter term . . ." Curricular data are presented and laboratory work described.

RAYMOND, ANNE.

(1553)

SOIL CONSERVATION IN THE ARIZONA SCHOOLS. Ariz. Teacher 24: 39-46, illus. October 1936.

"The study of soil conservation was initiated in April and May of 1936 in selected city and county schools of Pima, Gila, and Graham Counties." Study charts which would draw attention to fundamental principles in the conservation of land and water were worked out for the use of teachers carrying on the projects. Teaching demonstrations in various places are described.

SARGENT, C. S.

(1554)

MANUAL OF THE TREES OF NORTH AMERICA (EXCLUSIVE OF MEXICO). 826 pp., illus. Boston and New York, Houghton, Mifflin Co. 1905.

"In this volume I have tried to bring into convenient form for the use of students the information concerning the trees of North America which has been gathered at the Arnold Arboretum during the last thirty years." A map shows the eight regions into which the country is divided according to the prevailing character of the trees. A glossary of technical terms is included.

SCOATES, D.

(1555)

LABORATORY EXERCISES IN FARM MECHANICS FOR AGRICULTURAL HIGH SCHOOLS. U. S. Dept. Agr. Farmers' Bull. 638, 26 pp. illus. 1915.

"These exercises in rope work, farm power, farm buildings and machinery, surveying, tile drains, terracing, irrigation, and roads, are suggested to serve as a guide to the teacher of high school agriculture. Brief notes are given on library and laboratory equipment."—Expt. Sta. Rec. 32: 597. 1915.

TEACHING TERRACING WITH BLOCKS. Agr. Engin. 16: 190-191, illus. May 1935.

Practical examples are given students for solving problems of terracing by use of wooden blocks.

SMITH, C. F.

(1557)

STARTING A SOIL CONSERVATION PROGRAM IN THE SCHOOLS OF PIMA COUNTY. Ariz. Teacher 24: 46-48. October 1936.

STUDEBAKER, J. W.

(1558)

CONSERVATION BY EDUCATION. Amer. Forestry 42: 127, 149, illus. March 1936.

The author proposes the creation of a service in conservation education in the Nation's schools with three requirements: "First, it must have genuine scientific authenticity. Second, it must be organized for school use by professionally trained and experienced curriculum specialists in conformity with state and local curriculum offerings. Third, it must find its way to the pupils through the regular channels provided by the Federal, State and local educational agencies."

EDUCATION FOR CONSERVATION. Nature Mag. 27: 239. April 1936.

(1559)

"It would seem that while the Federal and State Governments are engaged in the terrific and somewhat disheartening struggle to repair by direct methods the damages which have been done to our forests, lands, streams, and wildlife by ignorance and indifference of our citizens, a small appropriation for education, through which there can quickly be put into the minds of millions of people the challenge to conserve what we have left and to rebuild our lost fortunes, would be the most profitable of all investments." The writer makes a definite estimate of the cost of such a service in the Office of Education—\$35,000 a year.

TEMPLETON, H. G. (1560)
 EROSION CONTROL WORK SAVES NATION'S YOUTH. *Purdue Agr.* 28: 33, 41, illus. February 1934.

A discussion of C. C. C. activity in Indiana on erosion-control projects. Shows how work of this type is valuable to the Nation and the individual C. C. C. enrollee.

THURMOND, M. F. (1561)
 VISUALIZING SOIL EROSION CONTROL. *Agr. Engin.* 16: 191-192, illus. May 1935.

Photographs show plaster of paris models of soil erosion and its various control methods, used in an educational exhibit at Dallas, Tex. The author believes that ideas presented in exhibits are more readily grasped by farmers than those contained in written form.

TOLLEY, H. R., AND OTHERS. (1562)
 SUGGESTIONS ON TRAINING FOR RURAL LAND-USE PLANNING. U. S. Resettlement Admin., Land Policy Cir. pp. 6-24. July 1936.

A discussion of rural land-use planning problems. "The problem concerns primarily the major use, i. e., crop-farming, grazing, forestry, wildlife, recreation, etc. As such, the issue is centered in broad problem areas which typically comprise poorer land resources—land areas 'marginal' or 'sub-marginal' for agriculture." Lists of courses for the training of rural land-use planning leaders or directors are given, pp. 20-23. A digest of important legislation of the Seventy-fourth Congress, second session, is presented, pp. 25-28.

UNION OF SOUTH AFRICA DEPARTMENT OF AGRICULTURE. (1563)
 FIGHTING SOIL EROSION. (Editorial.) *Farming in So. Africa* 8: 132. April 1933.

Deplores soil erosion as a great evil and notes that a special organizing officer has been appointed to fight it. It is contended that the erosion problem should be tackled in the schools; children should be taught to save their inheritance so that parents may be brought to a realization of their duties and responsibilities in this respect.

UNITED STATES DEPARTMENT OF AGRICULTURE. (1564)
 MAKING A MODEL TO SHOW HOW FORESTS PREVENT EROSION. U. S. Dept. Agri. Leaflet 58, 3 pp., illus. 1930.

"Directions are presented upon the construction and operation of an educational exhibit."—*Expt. Sta. Rec.* 63: 447. 1930.

—EXTENSION SERVICE. (1565)
 LET'S BE CONSERVATION MINDED. U. S. Ext. Serv. Rev. 7: 84. June 1936.

A plan for forest, soil, water, and wildlife conservation for members of Kansas 4-H clubs is proposed.

—EXTENSION SERVICE. (1566)
 TERRACING PROGRAM THAT BUILDS TERRACES. U. S. Ext. Serv. Rev. 5: 8. January 1934.

The development of terracing schools and the 5-year cooperative program for terracing in Tallapoosa County, Ala., is given together with estimates of construction costs.

—EXTENSION SERVICE. (1567)
 TERRACING TEXAS. U. S. Ext. Serv. Rev. 4: 23, illus. March 1933.

The curriculum of a Texas terracing school and methods of procedure are presented. Terracing in general is advocated: "The increased value of terraced land is estimated at \$8.00 per acre on the average."

—EXTENSION SERVICE. (1568)
 WHEN THE MOVIES COME TO TOWN; FORESTRY AND SOIL CONSERVATION METHODS ARE CLEAR IN LOUISIANA. U. S. Ext. Serv. Rev. 7: 75, illus. May 1936.

Tells of soil-improvement films shown in rural districts in Louisiana. The films are obtained from the United States Department of Agriculture, and are designed to emphasize and strengthen the practices recommended by extension agents.

UNITED STATES OFFICE OF EDUCATION.

(1569)

SOIL CONSERVATION; OUTLINES OF INSTRUCTIONS FOR EDUCATIONAL ADVISERS AND INSTRUCTORS IN CIVILIAN CONSERVATION CORPS CAMPS. C. C. C. Vocational Ser. 14, 191 pp. [Washington, D. C.] 1935.

This handbook is divided into six parts: Part 1 consists of general information on teaching methods and courses; part 2 consists of twelve 1-hour lessons on a general survey of the soil erosion problem; part 3, twelve 1-hour lessons on soils; part 4, twelve 1-hour lessons on agronomy; part 5, soil-erosion engineering; part 6, woodlands.

UNITED STATES SOIL CONSERVATION SERVICE.

(1570)

HANDBOOK OF EMERGENCY CONSERVATION WORK. 113 pp. 1937. [Mimeographed.]

"This Emergency Conservation Work Manual includes specific instructions with respect to the work to be done by the Civilian Conservation Corps under the Director of the Soil Erosion Service." Chapter headings: General Provisions; Administration; Personnel; Work Projects; Fiscal Regulations; Reports from the Field; Supplies and Equipment; Camps and Camp Sites; Fire Protection; Educational Program.

(1571)

PROCEDURE FOR STARTING A NEW PROJECT. U. S. Soil Conserv. Serv. SCS-AP-1, 33 pp. 1935. [Mimeographed.]

The purpose is to recommend practices so that new soil conservation watershed projects may begin in harmony with those already established. Partial list of contents: Starting the program; the work program; budgeting funds; method of procedure for division of conservation surveys in projects; procedure for developing the agronomic work on new projects; procedure for the development of plans for engineering work on new projects; procedure for setting up the division of erosion control practices on new projects; procedure to be followed in obtaining seedlings, fertilizer, limestone, and seeds of all kinds.

(1572)

TRAINING COURSES FOR NEW EMPLOYEES. U. S. Soil Conserv. Serv. SCS-AP-3, 68 pp. 1935. [Mimeographed.]

Outlines the general nature of the various Soil Conservation Service courses. The different courses described are as follows: Orientation; Soils; Agronomy; Forestry; Woodland and Wildlife Management; Engineering; Farm Planning and Reorganization. A classified bibliography is given for each course.

(1573)

UNIT COURSE—NUMBER ONE, AN ORIENTATION COURSE IN SOIL CONSERVATION, AND EROSION CONTROL FOR USE IN EMERGENCY CONSERVATION WORK CAMPS. U. S. Soil Conserv. Serv. SCS-AP-8, 64 pp. 1936. [Mimeographed.]

This unit course, calling for 12 lesson periods, deals with soil and moisture conservation from a general standpoint. Subjects treated are: The causes of erosion; types of erosion; control methods; relation of plant life to soil conservation; cropping practices; forest conservation; siltation; gully control; engineering phases; the use of trees and shrubs; vegetative covering; and bad farming practices.

(1574)

EROSION CONTROL METHODS FOR THE SOUTH CAROLINA PIEDMONT. Soil Erosion Serv. (Spartanburg, S. C.), 64 pp., illus. 1935. [Mimeographed.]

Intended for educational purposes in erosion control but is not to be taken as specific recommendations for erosion-control practices. Main headings are: Methods to be employed; soil classification; the soil profile; definitions of erosion terms; factors that influence erosion; utilization of eroded soils; land utilization; terracing; water disposal; vegetative plantings of controlled waterways and gullies; reforestation and wood-lot management; miscellaneous phases.

WARREN, G. F.

(1575)

ELEMENTS OF AGRICULTURE. [Rev. ed.], 549 pp., illus. New York. 1926.

"In preparing this book, the author has tried to carry out, as far as possible, the recommendations of the committee on methods of teaching agri-

culture of the Association of American Agricultural Colleges and Experiment Stations." In chapter 5 soil conditions are discussed including soil and water conservation, dry-land farming, irrigation, storage reservoirs, drainage. Chapter 6 treats of maintaining fertility in the land and considers the value of green crops as manure.

WOOD, JOHN O.

(1576)

TRAINEES ON THE NAVAJO. *The Land, Today and Tomorrow* 1: 19. October 1934.

Describes the training of young Navajo Indians who have been assigned to fieldmen in the various divisions of the Soil Erosion Service.

ENGINEERING IN EROSION CONTROL

ANONYMOUS.

(1577)

COMBATING SOIL EROSION. *Manfrs. Rec.* 103: 16, illus. February 1934.

The use of explosives in soil-erosion problems is recommended for clearing areas to be terraced and for ditching through lowlands to provide for the run-off of water, and for the blasting down of gully banks so that check dams and soil-saving dams may be constructed in the gullies.

(1578)

DITCHES REINFORCED WITH COTTON RESIST WEEDS AND EROSION. *Pop. Mech.* 67: 47. January 1937.

Roadside drainage ditches, soil-erosion-control ditches and irrigation ditches are all being built with cotton-reinforced-asphalt lining.

(1579)

MASTERPIECES OF PRIMITIVE ENGINEERING. *Sci. Amer.* 118: 225, 238, illus. March 16, 1918.

Describes the manner in which the natives in the Philippine Islands grow their rice on huge terraces high up in the mountains. "With no tool save a stick, with no power save that of arm and leg", the Igorot has converted whole mountains into giant flights of level spaces, and provided means to irrigate them. The rice terraces follow every curve of the mountain side. A description of the way in which these sementeras (seeded terraces) are constructed and arrangements made for water supply is given. The irrigation practiced by the Igorots is combined with fertilization. The water is run through masses of manure, ash, black alluvial soil, and decayed vegetable matter and carries the soluble portions to the rice fields with it.

(1580)

POWER AND LARGE DAMS. *Engin. News-Rec.* 117: 413-415, illus. September 17, 1936.

"Third World Power Conference and Second Congress on large dams held simultaneously in Washington; Power Conference devotes its entire time to economic questions; technical problems discussed at the Dam Congress."

(1581)

THE PURPOSES OF ROADSIDE IMPROVEMENT. *Pub. Works* 67: 23-24, illus. August 1936.

Advantages of improved roadsides are pointed out. "Erosion is one of the greatest causes of maintenance costs . . . A rim or berm ditch which is needed in certain cuts to protect the back slope against erosion, will pay many times over through the season for the cost of constructing it . . . Side ditches properly lined and protected are no longer subject to erosion and the resultant constant repair."

(1582)

ROAD CULVERT CHECKS DESTRUCTIVE STORM WATER FLOW. *Engin. News-Rec.* 81: 613-614, illus. October 3, 1918.

The writer describes and gives instructions on how to build a concrete drop-inlet culvert which guards against washouts and erosion of farm lands.

ANONYMOUS.

(1583)

SOIL AND WATER PROBLEMS. (Editorial.) Engin. News-Rec. 117: 485. October 1, 1936.

Conference on upstream engineering resulted in the conclusion that a drainage basin must be considered as a whole and not solely a part of upstream engineering. The purpose of the conference was "to consolidate engineering information on soils, rainfall and run-off as they relate to flood control and to soil and water conservation."

(1584)

USE OF SHEET STEEL IN PREVENTING EROSION. Engin. and Contract. 64: 411-414, illus. August 19, 1925.

The writer gives information on how to prevent erosion and gully development with open flumes.

(1585)

WATER CONSERVATION PROJECTS ON RED RIVER OF THE NORTH. Engin. News-Rec. 117: 179. July 30, 1936.

Outlines the set-up and gives costs of cooperative projects, between the National Resources Committee and the States of Minnesota, North Dakota, and South Dakota. The proposed work includes construction of small dams, restoration of natural lake levels, channel improvements, flood control, reduction of stream pollution, and improvement of municipal and rural water supplies.

ALKINS, D., JR.

(1586)

STREAM BED ENLARGEMENTS IN KANSAS; ERODED CHANNELS LEAD TO CULVERT AND BRIDGE FAILURE. Engin. News-Rec. 85: 882-883, illus. November 4, 1920.

The author describes a vertical-drop concrete box with retained-earth fill which solves the problem of stream-bed enlargement. "There is considerable economy in building a long culvert barrel and a low retaining wall at the outlet, as an alternative for a short barrel and high retaining wall."

AMERICAN SOCIETY OF AGRICULTURAL ENGINEERS.

(1587)

ENGINEERING PHASES OF SOIL EROSION CONTROL. Agr. Engin. 17: 205-214, illus. May 1936.

A symposium composed of papers presented at a meeting of the Soil and Water Conservation Division of the American Society of Agricultural Engineers at Chicago, December 5, 1935: Terrace Project Planning, by C. L. Hamilton; Erosion Control in Terrace Outlets, by J. C. Wooley; Lakes in Rural Communities, by L. C. Tschudy; The Farm Pond, by W. H. McPheters.

ANDERSON, L.

(1588)

WATER PROGRAM IN SANTA CLARA VALLEY. Pacific Rural Press 133: 366-367, illus. March 13, 1937.

A brief description of the program to replenish the well supply of water by percolation, put into operation by the Santa Clara Valley Water Conservation District. The detention reservoirs that were constructed and their effect on water levels is discussed.

ARMCO CULVERT MANUFACTURERS ASSOCIATION.

(1589)

PREVENTING BANK EROSION. In Handbook of Culvert and Drainage Practice, pp. 149-159, illus. 1930.

Practical methods of controlling ditch erosion are described, and the control of transverse gullies is discussed.

AYRES, Q. C.

(1590)

CONTROL OF SOIL EROSION. Amer. Soc. Agr. Engin. Proc. 16: 361-367. 1922.

"This is the 1922 Report of the A. S. A. E. Committee on Soil Erosion." Methods of prevention are discussed in detail, with emphasis on the use of the Mangum terrace and various types of dams. An appendix, showing the present status of soil erosion work in 12 States, is included.

- BAGOT, A. G. D. (1591)
A REVERSE SLOPE DRAINAGE SYSTEM. [Ceylon] Tea Research Inst., Tea Quart., 3 (pt. 3) : 73-76, illus. August 1930.
Three principles to follow in laying out of drains to prevent soil erosion are discussed. The method of conversion and the advantages of the system in operation are pointed out.
- BARTEL, F. O. (1592)
RESULTS OF RECENT ENGINEERING STUDIES IN SOIL EROSION CONTROL. Agr. Engin. 16: 304-307, 312, illus. August 1935.
"Perhaps the most fundamental of all of these investigations is the determination of the comparative soil and water losses from untterraced, terraced, and wooded areas." Results of experiments with all types of terraces and the costs of terrace construction are covered in detail. A discussion of farm machinery is included.
- BEELER, M. N. (1593)
WALKING WATERS. Capper's Farmer, 45: 8, 49, illus. October 1934.
One hundred and sixty-five acres of the best land in Dickens County, Tex., were ruined by a stretch of improved highway. The author describes the rehabilitation of this land through proper land-use practices such as building of level, sirup-pan terraces and damming of road ditches to turn drainage water onto the land through culverts. Other experiments with the sirup-pan system at the Spur branch of the Texas Agricultural Experiment Station are described.
- BERTRAND, H. W. R. (1594)
CONSERVATION OF SOIL AND WATER. Trop. Agr. [Ceylon] 74: 67. February 1930.
Two methods of conservation are described—one by converting drains into a series of water traps, and the other by "sponge pits."
- BOYD, G. R. (1595)
EXTENSION WORK IN AGRICULTURAL ENGINEERING, 1922. U. S. Dept. Agr. Cir. 270, 16 pp., illus. 1924.
"The chief extension activities in rural engineering carried on in 1922 were prevention of soil erosion, the drainage of swamp and wet lands, irrigation of arid or semiarid lands . . ."
- BRITO, F. S. DE, JR. (1596)
DROUGHT PREVENTION AND RELIEF IN BRAZIL. Bull. Pan Amer. Union 70: 925-931, illus. December 1936.
States that dams, large and small reservoirs, wells, irrigation canals, and drainage ditches are being constructed in Brazil in a widespread program for water conservation.
- BRYAN, KIRK, AND POST, GEORGE M. (1597)
EROSION AND CONTROL OF SILT ON THE RIO PUERCO, NEW MEXICO. Rept. to Middle Rio Grande Conserv. Dist. Spec. Exhibit R-1, illus. August 1928.
"The plan proposes the construction of silt retardation works on the Rio Puerco and its tributaries . . . The general method consists of small check dams built across the arroyos and small washes, and the planting and care of grasses, shrubs, and trees to prevent side erosion . . . In the larger arroyos it is planned to add a second series of checks, after the first series is filled with silt, thus accomplishing the required filling in two lifts . . ."
- BURGOYNE, W. M. (1598)
CAUSES OF EROSION AND VARIOUS METHODS OF SHORE PROTECTION. Canad. Engin. 66: 7-11, illus. June 12, 1934.
An explanation of waves and currents and their effect on coast lines. Two principal types of shore-protection structures, bulkheads, or sea-walls, and groins and jetties are described. Construction methods are illustrated.

BUTCHER, A. D. D., AND ATKINSON, J. D. (1599)

CAUSES AND PREVENTION OF BED EROSION, WITH SPECIAL REFERENCE TO THE PROTECTION OF STRUCTURES CONTROLLING RIVERS AND CANALS. Inst. Civ. Engin. Proc. 235: 175-278, illus. 1934.

The experiments were started in connection with certain problems of erosion which had arisen at the Sennar Dam controlling the Blue Nile, about 200 miles south of Khartoum. Two main types of control works were selected for experiment—the sluice-dam type and the open-regulator type. “Uniformity of sluice-opening and discharge had been recognized as essential on Egyptian barrages for many years . . . The Nag Hammadi barrage, only recently completed, had two bays of sluices at a lower level than the rest, and that had been the cause of considerable difficulty and bed-erosion.”

CALKINS, HUGH G. (1600)

EROSION IN RELATION TO TRAIL CONSTRUCTION. The Land, Today and Tomorrow 2: 35-38, illus. February 1935.

The author states that “The opening of roads and trails and the establishment of farm lanes and barn-lots raise problems of erosion control which those responsible for their creation must solve . . .” A few causes of excessive erosion in connection with road and truck-trail construction are given, and several recommendations are made regarding control through drainage devices and practices.

CHAMBERS, T. B. (1601)

THE SCS EROSION-CONTROL PROGRAM. Agr. Engin. 16: 301-303, illus. August 1935

Various erosion-control measures, the importance of demonstrational projects, and the relation of engineers to demonstrational programs are discussed

CHAMPSAUR. (1602)

FACINGS. Rev. Eaux et Forêts 51 (4): 97-101, illus. 1912.

“The methods employed in the Lower Alps in facings or building up ravines to promote the establishment of vegetation and also to prevent further loss from soil erosion are described.”—Expt. Sta. Rec. 26: 643. 1912.

CLEGHORNE, J. W. (1603)

FIGHTING EROSION AT THE GLEN SCHOOL OF AGRICULTURE. Farming in So. Africa 8: 271-272, illus. July 1933.

The repairing and safeguarding of a large earthen dam embankment that was seriously threatened by floodwaters is described.

SOIL EROSION. SIMPLE HINTS. Glen-Jaarblad; (Glen Ann.) 3 (1): 31-39, illus. 1935-1936. (1604)

The most common difficulties of South African farmers in controlling soil erosion are given in replies to the following questions: (1) Prior to the construction of a dam embankment, how are the bottom widths obtained and indicated on the site? (2) What should be the shape, sizes, and fall of contour banks? (3) How can a sluit, which is extending uphill and laterally, be treated?

CLEGHORNE, W. S. H. (1605)

PRACTICAL SOIL EROSION-CONTROL MEASURES. Farming in So. Africa 5: 535-536, illus. February 1931.

Soil-erosion control work carried out on the farm of Senator Oosthuizen in the Cape Province is described. It includes dam building, contour plowing, and reclamation of gullies. The construction of obstruction banks on upright pole and cross-tie bases is shown.

COLLINS, DUDLEY. (1606)

WHY HIGHWAY ROADSIDE IMPROVEMENT PROJECTS. Miss. Highways 5: 38, 69. April 1936.

Eight factors are presented in support of the need for giving careful attention to highway improvement. The author states that stabilization of slopes reduces erosion; more adequate drainage is provided; the drifting of snow, sand, and dust is in part controlled; traffic hazards are greatly

reduced and the need for guardrail posts decreased; the cost of mowing roadsides is reduced; land and property values are enhanced; land-drainage claims are lessened; and better public relations are promoted.

- COOKE, M. L. (1607)
AN ENGINEER LOOKS AT RURAL AMERICA. Jour. Land and Pub. Util. Econ. 12: 1-11. February 1936.

Discusses basic problems of rural life, especially soil erosion, as remediable through cooperative effort and intelligent leadership. Emphasis is placed upon rural electrification as an important factor in control and utilization of headwater streams as a means of soil conservation.

- GRAM, C. M. (1608)
BEACH EROSION IN SOUTHERN CALIFORNIA. PROTECTIVE STRUCTURES NEEDED TO OFFSET REDUCTION OF STREAM SAND SUPPLY BY CONSERVATION WORKS. Civ. Engin. 6: 808-809, illus. December 1936.

The author maintains that the principal sand-carrying agencies along the southern coast are rivers, and that as a result of the construction of numerous irrigation and flood-control works along these rivers, the supply of beach sand is diminishing.

- DOGGETT, DENZIL. (1609)
IMPROVED FACILITIES AT CLIFTY FALLS; PICNIC AREAS MADE MORE ACCESSIBLE BY NEW ENTRANCE ROADS; WATER SUPPLY, SANITARY FACILITIES AND OTHER FEATURES IMPROVED. Highway Mag. 27: 79-82, illus. April 1936.

The author describes a road in Clifty Falls Park, Ind., "Corrugated pure iron paved invert culverts were used for cross drainage in anticipation of the excessive scour caused by the erosion of the soft limestone ledges laid bare in the construction work and by materials washed from the hillside above it."

- DREIBELIS, F. R., AND KOHNKE, HELMUT. (1610)
STABILIZATION OF ROADSIDE BANKS. Soil Conserv. 3: 38-41, 52, illus. August 1937.

Describes methods of controlling erosion along roadsides on the watershed project near Coshocton, Ohio. Methods employed are the use of mulch in check plots, brush, and check dams. An itemized estimate of costs totaling \$654.64 in protecting 85,300 square feet of road is given.

- DRUMMOND, T. M. (1611)
SOIL EROSION. Jour. Dept. Agr. So. Aust. 40: 360-362. November 1936.

This paper is confined to water erosion. Contour drains, their measurement, and construction are discussed.

- DU TOIT, E. (1612)
VELD IMPROVEMENT BY MEANS OF CONTOUR BANKING. Farming in So. Africa 9: 410, illus. October 1934.

"On a recent visit to the Grootfontein School of Agriculture a study was made of the effects on the vegetation of the erosion control methods by means of contour banking." Data thus acquired is discussed.

- ELLISON, W. D. (1613)
ENGINEERING PRACTICES AND STANDARD PLANS FOR E. C. W. EROSION CONTROL CAMPS. U. S. Soil Conserv. Serv. SCS-EP-12, 70 pp, illus. 1936. [Mimeographed.]

Deals with various phases of the subject and discusses the following control methods: Dams, terracing practices, gully control, etc. Three steps in the conservation program are described. Data are given on the following phases of the work: Planning of terrace systems with controlled outlets, terrace design and staking, terrace realignment, diversion ditches, and design of check dams.

- ENSMINGER, M. E., AND FISHER, F. A. (1614)
GULLY EROSION AND ITS CONTROL. Soil Erosion Serv. 37 pp., illus. April 1934. [Mimeographed.]

Main headings are: Causes and types of gullies; types of dams for Illinois region; wire check dams; wire basket net dam; post dam; staked lower center brush dam; two post brush dam; multiple post dam; log dam; loose

rock dam; sod bag dam; diamond sod dams; willow dam; diversion ditches; computing the size of weir notches; plowing in gullies; revegetation; seedling mixtures; and gully prevention.

ERVIN, G. (1615)
EXTENSION WORK IN AGRICULTURAL ENGINEERING, 1923. U. S. Dept. Agr. Cir. 344, 9 pp., illus. 1925.

"An outstanding feature of extension activities in agricultural engineering in 1923 was the wide range of subjects covered . . . The year's work shows . . . that agricultural engineering now occupies a place of prominence in rural life comparable with animal husbandry, home economics, agronomy, and other important phases of extension work." Drainage was first among engineering-extension activities, and of equal importance was the prevention of soil washing or erosion through the building of soil-saving dams, contour farming, and the growing of leguminous crops. The accomplishment in rural-engineering extension is indicated in a table compiled from reports of county extension workers.

EVANS, G. (1616)
RABI FIELD EMBANKMENTS. Agr. Jour. India 8: 117-127. April 1913.

In the black soil tract of the Nerbudda Valley in the central Provinces of India a system of rabi cultivation is practiced. Low embankments enclose fields so that the monsoon rainfall is impounded "until sowing time approaches, when it is let out and the fields sown as soon as the land is dry enough." Rice crops in lower fields are irrigated when the banks are cut. The author describes the construction of these banks. The method of cultivation and the conditions essential for the practice of this system, its advantages and disadvantages, are discussed. Wheat and rice are the crops grown.

FORRESTER, KHYBER. (1617)
S. O. S.—SAVE OUR SOIL. Christian Sci. Monitor Weekly Mag. Sec., illus. February 27, 1935.

A heavy rain can destroy a rich farm in 1 day under some conditions. Erosion eats away much of the land, but engineers can prevent it and make water repair its own damage. Sheet erosion and gullying can be fought by building terraces, contour farming, strip cropping, dam building. There is a great future for erosion engineers in the opinion of the author.

FRONZI, L. (1618)
ORDINAMENTO DELLE ACQUE IN COLLINA. Il Coltivatore. 121 (Anno 66): 154-158, 182-186, illus. 1920.

The method of water control on hills here described is that of terraces divided by water channels. These are cut in diagonal and parallel directions in order to impede and prolong the passage of the waters, thus preventing the loss of soil and moisture. Aqueducts and brush dams are used for the control and orderly maintenance of the cross channels. The formation is that of a thorn, hence the name "spina" system.

FRY, A. S., AND HICKOX, G. H. (1619)
CALCULATING FLOODFLOW OVER AN EMBANKMENT. Engin. News-Rec. 106: 557-558, illus. April 2, 1934.

"Calculation of the flow of floodwater over a railroad embankment was the most important element in a problem which arose after the 1927 flood on the White River in Arkansas. The Missouri Pacific Railroad then proposed to raise its tracks above flood level, which involved flood heights at Newport, Ark., a leveed town of 8,000 population at the north end of the proposed raise." The author discusses various phases of this engineering problem.

GÈZE, M.
METHODS FOR ARRESTING AND UTILIZING MOVING ALLUVIAL MUD. Rev. Sci. [Paris] 48: 628. November. 1910. [Abstract in Internatl. Inst. Agr. Rome Monthly Bull. Agr. Intel. November-December 1910.]

Describes the methods employed in the Netherlands for arresting and reclaiming the moving mud which borders the Rhine and the Meuse near Rotterdam. The abstract says: "M. Gèze's report is interesting . . . chiefly because it should be possible to imitate the Dutch in several countries in the reclamation of extensive lands."

- HAVILAND, P. H. (1621)
SOIL EROSION. Rhodesia Agr. Jour. 26: 128-136, illus. February 1929.

This article, the second of a continued series on erosion and erosion control in Rhodesia, deals with the construction of storm drains as a control measure.

- SOIL EROSION PREVENTION IN NYASALAND. Rhodesia Agr. Jour. 27: 1258-1260, illus. December 1930. (1622)

This article briefly describes erosion control by contour ridging on three large tea estates.

- HILTON, H. C. (1623)
STREAM IMPROVEMENT WORK IN THE ROCKY MOUNTAIN REGION. Jour. Forestry 32: 766-768. October 1934.

The author classifies stream-improvement work on national-forest areas as: Small stream pools built of logs or rocks designed to increase depth of water in streams; large pools or fish ponds which correspond to artificial lakes; and rearing ponds in which fry are placed before being liberated in streams or lakes of the region. A résumé of this work under the C. C. C. camps is given.

- HOWE, G. S. (1624)
KEEPING THE FARM AT HOME. Country Gent. 82: 685. April 7, 1917.

Reclaiming of acres that are being wasted is one way of increasing the size of a farm. Concrete and other walls to prevent soil washing, and the use of simple brush dams to stop gullyng are advocated. Samples are given of work of this type on a farm in Montgomery County, Ind.

- JONES, L. A. (1625)
ENGINEERS AND THE CONTROL OF EROSION. Agr. Engin. 13: 234-236. September 1932.

Address given at the annual meeting of the American Society of Agricultural Engineers, Columbus, Ohio, June 23, 1932. The place of the agricultural engineer in soil erosion is discussed.

- ENGINEERING EXPERIMENTAL PROGRAM OF THE SOUTHWEST. Okla. Agr. Expt. Sta. Cir. 79, 23 pp. 1931. (1626)

A paper read at the second Southwest Soil and Water Conservation Conference. The object of the program is defined as the development of the most economical type of engineering structures for the control of erosion under local conditions, and the improvement of terracing methods.

- JUDD, L., and KELLY, H. J. (1627)
SOIL EROSION. CONTOUR DRAINS WILL CONTROL IT ON WHEAT LAND. Agr. Gaz. N. S. Wales 43: 801-805, 905-908, illus., 1932; 44: 21-26, illus., 1933.

The causes of soil erosion and methods for controlling it are discussed. The use of broad-base contour drains or terraces is advocated, and essential points for consideration in their construction are cited. The authors further discuss methods of taking levels for the drains by the use of a home-made "level", the construction of which is described along with the actual construction of contour drains.

- KAISER, W. G. (1628)
THE ENGINEERING FACTOR IN RECLAMATION. Agr. Engin. 11: 91-93, illus. March 1930.

The opposition of the uninformed to what they regard as land reclamation or "the Reclamation Racket," is discussed by the writer. He points out the destructive phases of soil erosion and the necessity of land utilization and quotes a number of authorities on the subject.

- KEUTNER, C. (1629)
MASSNAHMEN ZUR BEKAEMPFUNG DER KOLKBILDUNG STROMAB VON STAUNLAGEN MIT WEHRBODEN. Bauingenieur 17: 279-289. July 10, 1936. [Reviewed in Civ. Engin. 7 (2): 10. February 1937.]

The author discusses measures for combating erosion downstream of dams and weirs provided with aprons, based on recent theoretical and experi-

mental studies; effect of dentated sills and downstream end of apron as observed on German weir installations; effect of riprap and of training walls on prevention of downstream erosion.

KRAMER, E. W., ANDERSON, A. L., and ARTHUR, M. B. (1630)

HANDBOOK OF EROSION CONTROL ENGINEERING ON THE NATIONAL FORESTS.

U. S. Forest Serv. Div. Engin. 89 pp., illus. 1936.

This handbook is designed for use in the national forests and emphasizes the measures which apply to comparatively undeveloped types of land rather than those for agricultural purposes. Headings indicate the scope of the book. They are: The Erosion Problem on National Forests; Erosion Control Measures; Hydraulics of Erosion Control; Gully Structures; Estimated Cost of Obliterating a Gully; Soil-Saving and Debris Dams; Miscellaneous Structures.

LANE, E. W. (1631)

STABLE CHANNELS IN ERODIBLE MATERIAL. Amer. Soc. Civ. Engin. Trans. 102 (paper 1957): 123-142, illus. 1937.

"The design of the All-American Canal, which will divert 15,000 cu ft per sec from the Colorado River, required a thorough study of stable channel shapes. Data from various sources were conflicting and unsuitable for the unusual conditions on this canal. These data were analyzed and conclusions drawn regarding the various factors controlling stable channel shapes and the relation between them." A general discussion followed the reading of this paper.

LEOPOLD, A. (1632)

A PLEA FOR RECOGNITION OF ARTIFICIAL WORKS IN FOREST EROSION CONTROL POLICY. Jour. Forestry, 19: 267-273. March 1921.

"The author discusses the factors which lead to the erosion of forest lands, particularly stream valleys and sodded open uplands, and points out the necessity of supplementing a proper system of grazing control by artificial control works, such as crude dams, tree planting, etc."—Expt. Sta. Rec. 45: 46. 1921.

MCALISTER, J. T. (1633)

HYDRAULIC STUDIES OF EROSION CONTROL. Soil Conserv. 1: 10, illus. May 1936.

Describes the work on a field hydraulic laboratory at Gilreath's Shoals on Beaverdam Creek, near Tigerville, S. C. Tests discussed are for the determination of proper designs of dams, baffles, flumes, etc.

MCCRORY, S. H. (1634)

LAND RECLAMATION WORK OF THE BUREAU OF AGRICULTURAL ENGINEERING. Agr. Engin. 12: 305-306, illus. August 1931.

The program of the Bureau of Agricultural Engineering for land reclamation includes irrigation, drainage, the engineering phases of the control of soil erosion, and land development, including the application of agricultural engineering to the improvement of individual farms.

(1635)
SOIL EROSION CONTROL. U. S. Bur. Agr. Engin. Rept. Chief. 1933: 8-11. 1933.

Discusses various factors in terracing, the use of machinery on terraced land, and check dams for gully control.

MACDONALD, A. B. (1636)

TREACHEROUS BIG MUDDY. Country Gent. 89: 6, 18, illus. November 1, 1924.

An account of how several farms were engulfed by the Missouri River. Dredging and bank revetment, putting in retards made of willow and wire mattresses for catching drift stuff and slowing down the current were found practical. Permeable dikes are recommended for river control.

MCDOWALL, G. W. (1637)

THE EROSION OF SIOUX POINT, SOUTH DAKOTA. U. S. Monthly Weather Rev. 39: 877. June 1911.

"Within the past few years the Missouri River has encroached rapidly upon the South Dakota shore line for a distance of 3,000 yards above the junction of the Missouri and Big Sioux Rivers." Action as to shore pro-

tection was delayed, in spite of Government appropriations allotted for the purpose, until conditions became critical during the spring of 1911. It is intended, with the help of a larger appropriation, "to protect the shore by riprapping from Gumbo Point to Sioux Point . . . A woven mat, 75 to 80 feet wide, will be used, one side being ballasted with rock and sunk in the stream, the other reaching up over the bank. The bank will then be rock paved over its entire face."

McGAFFEY, ERNEST.

(1638)

NATIONAL HIGHWAY PROBLEM. Natl. Repub. 21: 21, 31, illus. March 1934.

In describing the relation of soil erosion to highways and public roads the author says—"a very insidious and menacing hazard under which highways in many states labor, is the gradual wearing away of the slopes and hillsides which stretch away below them, or the disintegration of the elevations which rise above them . . ." In outlining methods of erosion control for road slopes, he discusses some aspects of drainage, and four methods of control (1) seeded trenches without reinforcement, (2) the same with cut-brush wattles, (3) stakes, brush wattles, and pegs, and (4) dry-laid rock terraces with alternate brush wattles.

McGREW, P. C.

(1639)

ENGINEERING EXPERIMENTS IN SOIL EROSION CONTROL IN THE NORTHWEST. Agr. Engin. 16: 187-189, illus. May 1935.

Data on soil loss are given for Oregon, Washington, and Idaho where the Parshall flume and Ramser silt sampler were used to determine the run-off and soil losses. Various aspects of erosion control are discussed.

McPHERTERS, W. H.

(1640)

REPORT ON PROTECTING ROAD AND HILLSIDE DITCHES WITH CONCRETE Baffles.

Okla. Agr. Expt. Sta. Cir. 79: 57-61. 1931.

A paper read at the second Southwest Soil and Water Conservation Conference. Describes the building of baffles or retarders at the Oklahoma Agricultural Experiment Station at Guthrie. Contains a table of material and labor used in their construction and discusses a method of building baffles without forms.

MARKHAM, E. M.

(1641)

RESULTS OF EXPERIMENTS LOOKING TO THE DEVELOPMENT OF A FORM OF SUB-AQUEOUS CONCRETE REVETMENT FOR THE PROTECTION OF RIVER BANKS AGAINST SCOUR OR EROSION. U. S. Army Corps Engin. Prof. Memoirs 8: 721-733, illus. 1916.

Experiments were conducted along the banks of the lower Mississippi. The author describes the routine of the work. "The use of heavily reinforced concrete sheets after the manner described is not necessarily confined to bank revetment. They may be employed in any situation around or about the base of a structure to resist undercutting or erosion."

MARSH, H.

(1642)

PROTECTIVE WORKS IN CENTRAL INDIA. Agr. Jour. India 1: 290-298. October 1906.

The author proposes measures likely to prevent soil erosion in central India. Old water works of all kinds should be restored, "as every drop of water should be conserved in Central India for the purposes of (a) strengthening the under-ground reservoirs; (b) creating dew, and reducing the aridity of the climate; and (c) increasing the comfort of man and beast." Tanks, wells, and lakes for arresting the flow of rain water should be restored or constructed.

MORSE, F. T.

(1643)

NEW FORM OF RIVER BANK PROTECTION. Railway Age 66: 1279, illus. May 1919.

The writer describes a jetty which consists of one or more units, recently developed and put into service locally along the Kansas or "Kaw" River in the vicinity of Topeka, Kans. "The advantages of this jetty lie largely in its relatively cheap installation cost and the short time required to place it, as compared with other means of bank protection . . . In all of 37 places where jetties of this kind have been installed the river has stopped cutting."

MYERS, BERT.

(1644)

EROSION PREVENTION WITH IOWA'S LIP TYPE CURB ON HIGHWAY PAVEMENTS.

Highway Mag. 27: 4-7, illus. January 1936.

"The lip or sloping type of curb for highway pavements was first designed as a solution for the problem presented by the peculiar soil conditions existing in the vicinity of Sioux City. The soil in this region is loess, which erodes very rapidly." The method of building the curb is described and practical features are discussed. The Iowa Highway Commission is of the opinion that it not only provides a very satisfactory solution to the problem which caused it to be designed originally, but that it also has a much wider field of application.

OOSTHUIZEN, E. A.

(1645)

PROVIDING FOR THE SAFE DISCHARGE OF FLOOD WATERS AT ANTI-SOIL-EROSION

WORKS. A DESIGN OF SPILLWAYS. Farming in So. Africa 12: 78-79, illus. February 1937.

PETTIS, C. R.

(1646)

STABLE CHANNELS IN ERODIBLE MATERIAL. Amer. Soc. Civ. Engin. Proc.

62: 553-567. April 1936.

Discussion by E. S. Lindley, J. C. Stevens, H. F. Blaney, and S. Eliassen.

POWERS, W. L., and TEETER, T. A. H.

(1647)

LAND DRAINAGE. ED. 2. 353 pp., illus. New York, John Wiley & Sons. 1932.

"This book deals with the subject of drainage primarily from the agricultural standpoint, and the subject has been developed largely as a matter of applied soil-physics. Drainage is considered herein as a means of reclaiming additional areas and of making wet lands more productive. . . . The present volume is intended, first, as a text book for students of general agriculture or agricultural engineering; second, as a reference book for practical farmers; and third, as an aid to owners of wet, overflowed, marsh, swamp or alkaline land who desire to improve their holdings. . . . Review questions, general references and laboratory exercises have been included to help make up the kind of book that has seemed to the writers to be needed." Part III includes a chapter on the prevention and control of erosion with special reference to terracing.

RAMSER, C. E.

(1648)

LATEST RESULTS OF ENGINEERING EXPERIMENTS AT THE SOIL EROSION EXPERIMENT STATIONS. U. S. Bur. Agr. Engin. 12 pp. 1934. [Mimeographed.]

"This is a brief mimeographed contribution in which the progress results of the engineering experiments in progress at the soil erosion experiment stations, conducted mainly in cooperation with several state agricultural experiment stations. . . ."—Expt. Sta. Rec. 72: 700. 1935.

(1649)

STATUS OF SOIL EROSION CONTROL. Agr. Engin. 12: 218, illus. June 1931.

"Terracing and soil-saving dams have been generally accepted as the most effective means so far devised for controlling erosion on cultivated land." The future possibilities of terracing and terracing machinery, and its cost are discussed.

—AND KRIMGOLD, D. B.

(1650)

DETAILED WORKING PLAN FOR WATERSHED STUDIES IN THE NORTH APPALACHIAN REGION. U. S. Soil Conserv. Serv. WHS. No. 1, 80 pp. November 1935. [Mimeographed.]

This plan, together with appendices 1, 2, 3, and 4, represents a sample of the working plans prepared for each of the watershed studies to be made in 10 typical agricultural regions of the United States. The figures attached to the detailed working plan represent the general types of structures, apparatus, and installations to be employed in the studies.

REED, OREN

(1651)

SWISS METHODS OF AVOIDING SILT DEPOSITS IN RESERVOIRS. Engin. News 107: 289-290, illus. August 20, 1931.

"Debris deposition in reservoirs has recently received special attention in the United States, particularly in the West. . . . European methods of

eliminating debris deposition have been studied by the author at first hand, and a brief general description of typical practices is presented in the following." The diversion dam and the bypass-tunnel method are outlined.

- ROE, H. B., and NEAL, J. H. (1652)
SOIL EROSION CONTROL BY ENGINEERING METHODS. Minn. Agr. Col. Ext. Spec. Bull. 171, 24 pp., illus. 1935.

"The final effective solution of the soil erosion problem even on a single farm requires employment of engineering practices and, in many cases, the services of a trained agricultural engineer. To present these engineering phases in a form that will enable the farmer and the rural engineer to co-operate effectively in soil erosion control activities is the purpose of this bulletin." The construction of Mangum terraces, gully control, and elimination are discussed.

- RONNA, A. (1653)
DEFENSE DES RIVES DES COURS D'EAU. Jour. Agr. Prat. 60 (35): 309-312, illus. 1896.

In the Netherlands and on the Rhine the buttresses, or heads of dikes, are made with woven trees, gravel, and clay. They are fastened to platforms which are sunk at the desired places, the short side in a parallel line with the current and the longer in a perpendicular direction. The writer describes types used in Italy and on the Nile in Egypt. A technical and detailed description of construction methods.

- ROONEY, L. J. F. (1654)
SAVE THE SOIL. Prof. Engin. 14: 9-11, illus. September 1929.

Quotes from Department of Agriculture circulars on the yearly loss of soil by erosion. The menace must be dealt with by engineers. Cites circulars of the Oklahoma Agricultural College on terracing and controlling gullies and ditches.

- ROOSEVELT, F. D. (1655)
RESPONSIBILITY OF ENGINEERING. Science 84: 393-394. October 30, 1936.

Letter from President Roosevelt to the president of Massachusetts Institute of Technology relative to "the social responsibility of engineering." The latter's reply is included.

- RYERSON, GERALD E. (1656)
MECHANICAL INGENUITY SPURRED BY PROBLEMS PECULIAR TO SOIL CONSERVATION. Soil Conserv. 2: 176-180, illus. February 1937.

"In various projects and camps many special tools have been devised which make it possible for the field work of the Soil Conservation Service to be done much more efficiently. Both major and minor pieces of equipment have undergone changes to fit them to particular tasks and to local conditions." Illustrations show various types of sod cutters and other farm implements.

- SAVAGE, J. L. (1657)
DAMS AND HYDRAULICS. Engin. News-Rec. 116: 200-202, illus. February 6, 1936.

The author discusses design and construction of Government-financed projects with particular reference to noteworthy improvements in the field of dam construction and hydraulics.

- SIMONS, C. E. (1658)
TOMORROW'S HIGHWAY. Tex. Parade 2: 10-11, 25-27, illus. August 1937.

Highway erosion control in Texas. The plan advocated by W. A. French, division engineer for the highway department at Abilene "proposes to retain on the land on which it falls all, or nearly all, of the rain water. This would be accomplished by proper measures taken within each drainage area. If the water is held on the land it follows that it cannot damage the highway." This plan, which is said to conform to the modern trend in highway construction, calls for elimination of ditches, culverts, or other visible drainage structures.

- SPUY, M. J. VAN DER. (1659)
 FIGHT AGAINST SOIL EROSION. *Farming in So. Africa* 8: 222-224, illus. June 1933.
 Wire barricades and steep slopes are the subject of this article. The advantages and disadvantages of wire barricades are stated, and reinforced rubble embankments for the reclamation of gullies are described and illustrated.
- STEWART, J. L. (1660)
 PROTECTING STREAM BANKS AGAINST EROSION. *Engin. and Contract.* 69: 243-244, illus. June 1930.
 As practical measures for protecting stream banks against erosion the author recommends the retard method, concrete mattresses, stone mats, pile dikes, and stone baskets. Advice on construction is given.
- PROTECTION OF ROADS AND BRIDGES AGAINST STREAM EROSION. (1661)
Streets 70: 171-172, illus. May 1930.
 Among available measures of protection against stream erosion, the author describes the retard method, concrete mattresses, stone mats, pile dikes, and stone baskets.
- SUTHERLAND, R. A. (1662)
 SOME ASPECTS OF WATER CONSERVATION. *Amer. Soc. Civ. Engin. Proc.* 56 (pt. 1): 1505-1545, illus. September 1930.
 "This paper represents an attempt to reduce to general and simple terms those factors which admit of generalization . . . Formulas are developed for studying, in a preliminary manner, the merits of various storages and dam sites . . ."
- TAFT, L. R. (1663)
 SAVING SURFACE SOIL AND PREVENTING EROSION. *Mich. Agr. Expt. Sta. Quart. Bull.* 14: 237-244, illus. 1932.
 "Practical information is presented on erosion prevention in Michigan orchards, special attention being devoted to terracing methods, repairing washouts and gullies, and the use of dams."—*Expt. Sta. Rec.* 67: 463. 1932.
- TIBBETTS, F. H. (1664)
 WATER CONSERVATION IN THE SANTA CLARA VALLEY IS ACCOMPLISHED BY ROLLED EARTHFILL DAMS. FALLING WATER LEVEL THREATENS RICH AGRICULTURAL AREA IN CALIFORNIA—SIX DAMS BUILT TO CONSERVE FLOOD FLOWS FOR UNDERGROUND STORAGE—3,500,000 CU. YD. OF FILL HANDLED BY TRACTOR-SCRAPEE UNITS. *West. Const. News* 11: 154-158, illus. May 1936.
 Describes geological formations of the area, foundation preparations for dam constructions, general design requirements, and details of the six dams. Contains table presenting data on Santa Clara Valley Water Conservation District reservoirs.
- TOMSON, F. D. (1665)
 SAVING THE RIVER BOTTOM LANDS; THE LATEST METHOD OF PROTECTING RIVER BANKS FROM EROSION. *Field Illus.* 32: 625-627, illus. October 1922.
 Loess soil along the Missouri River and its productivity is discussed. Detailed description of "a reinforced concrete pile that could be sunk to solid rock regardless of depth" is given. This pile solved the problem of foundations and offered a solution of the river-bank-protection problem. Other measures of river-bank protection are outlined.
- TsCHUDY, L. C. (1666)
 ENGINEERING STRATEGY IN WIND EROSION AREA. *Soil Conserv.* 1: 12-14, illus. January 1936.
 A discussion of some of the mechanical and administrative problems involved in preventing wind erosion on the Great Plains.

UNION OF SOUTH AFRICA, DEPARTMENT OF NATIVE AFFAIRS. (1667)

COMBATING SOIL EROSION IN THE NATIVE RESERVES OF THE UNION (EXCLUDING THE TRANSKEI). Union So. Africa. Dept. Native Affairs. [Pretoria.] 13 pp., illus. July 6, 1934.

Presents practical data on the control of soil erosion by means of terraces, dry-stone walling, and contour banks.

UNITED STATES BUREAU OF AGRICULTURAL ENGINEERING. (1668)

WHAT IS NEW IN AGRICULTURAL ENGINEERING. Agr. Engin. 17: 258. June 1936.

Announcement is made of an agreement between the Bureau of Agricultural Engineering and the National Resources Committee, for cooperation with the Geological Survey, Bureau of Reclamation, Resettlement Administration, Soil Conservation Service, and the States of Colorado, New Mexico, and Texas, in studies of water-supply needs and uses in the basin of the Rio Grande about Fort Quitman, Tex.

UNITED STATES FOREST SERVICE. (1669)

HANDBOOK OF EROSION CONTROL ENGINEERING ON THE NATIONAL FORESTS. U. S. Forest Serv., Div. Engin. 90 pp., illus. Washington, Govt. Print. Off. 1936.

"The purpose of this handbook is to serve as a guide in carrying on erosion control work in the national forests. It therefore emphasizes the control measures which apply to comparatively undeveloped or forested types of land rather than those for agricultural or cultivated areas. The greater part of the handbook deals with the design and construction of engineering structures which have proven practicable for erosion control work, and with the considerations which affect the choice and use of these structures."

VON TREBBA, R. L. (1670)

EROSION CONTROL WITH CULVERTS. Highway Mag. 26: 296-298, illus. December 1935.

Tells how the destructive effects of water are being curbed through a coordinated program of soil conservation. Gully-control work is fully described.

WHITSON, J. (1671)

FIGHTING EROSION ON A TEST FARM. HOW TWO MEN ARE TACKLING THE PROBLEM IN NORTHERN MISSOURI. Wallaces' Farmer 56: 828, illus. July 11, 1931.

The author describes the work on an experiment farm near Bethany, Mo., for the study of erosion and its control. Examples of terracing and various types of dams are discussed. Particular mention is made of "bag and bluegrass dams."

WILLOMITZER, ALFRED. (1672)

FORSTLICHE UND FORSTTECHNISCHE ARBEITEN DER WILDBACHVERBAUUNG IM GALGENTOBEL. Osterr. Vrtljhrs. Forstw. 86 (1): 4-36; 86 (2): 85-102, illus. 1936.

The author treats the art of building embankments for forest springs and dams for torrents very comprehensively. He gives data on the methods and costs of forest and forest-technical work in the Galgentobel and in conclusion states that his object in describing work on a small scale is to show by facts what can be done in a larger way.

DAMS AND RESERVOIRS

ANONYMOUS. (1673)

CONSTRUCTION OF CHECK AND SOIL-SAVING DAMS IS ESSENTIAL TO A COMPLETE EROSION-CONTROL PROGRAM. Ag-Ex News 3: 11-12, illus. January 1934.

"Soil-saving dams are of two types. In one type the run-off is carried around or over the dam by spillways. In the other it is carried through the dam by a pipe or culvert." Instructions for building dams are given in detail.

ANONYMOUS.

(1674)

COUNTER-EROSION WORK IN THE PUNJAB. *Indian Forester* 50: 339-342. June 1924.

A description of erosion-control work in the Pabbi Hills, which form an extension of the Himalayan foothills out into the flat expanse of the Punjab Plain. "Of the various methods which have been used for checking the erosion the original scheme of building low dry stone dikes across the V of the ravine channels and along the foot of unanchored screes, has proved the most useful."

(1675)

DROUGHT AND ENGINEERING. *Science* 84 (Sup.): 6. July 10, 1936.

Discusses the importance of engineering in agriculture. States that "one of the unremitting efforts of both federal and state agricultural engineers, in all the West, has been to teach men how to build dams, so that at least a piece of the creek might remain on the farm, to keep the stock alive after the rest of the water has all run by . . . And, incidentally, these dams will not merely save water, they will help to save the land, too, from the gnawing curse of soil erosion."

(1676)

DROUGHT INSURANCE WITH 1,600 DAMS. *West. Farm Life* 39: 10, 23, illus. June 15, 1937.

"Hundreds of small water storage dams constructed as projects of the Works Progress Administration in the western states are receiving their first tests this summer. Designed to prevent soil erosion, to provide convenient and accessible stock-watering facilities in dry periods, and often to provide irrigation facilities for considerable tracts of land, these dams were built to hold back for the summer sufficient of the winter and spring rainfall runoff to prevent recurrence of what have amounted to disastrous conditions in the past."

(1677)

ELK CITY EARTH DAM FAILS DURING DELUGE. LONG, LOW EMBANKMENT IN OKLAHOMA WASHED OUT AT MIDPOINT AS SPILLWAY PROVES INADEQUATE TO PASS CLOUDBURST STORM. *Engin. News-Rec.* 116: 678. May 7, 1936.

(1678)

OVERTOPPING CAUSES FAILURE OF ELK CITY DAM. *Engin. News-Rec.* 116: 850-851, illus. June 11, 1936.

"Rainfall of 4.7 in. in two hours results in a flood that went over the top of an earth-fill water-supply dam whose spillway crest had been raised 2½ ft. recently to increase reservoir capacity."

(1679)

POINTERS FOR BUILDING CHECK DAMS IN GULLIES. *Ariz. Prod.* 12: 12. February 15, 1934.

Instructions for building permanent and temporary dams are given.

(1680)

RESERVOIRS, NOT PONDS. (Editorial.) *Engin. News-Rec.* 117: 522. October 8, 1936.

Cites the effective work of two completed flood-detention reservoirs for the Winooski River in northern Vermont as an example of what can be done to reduce flood damage. This "could not have been accomplished at all with a lot of little ponds way up on all the tributary brooks."

(1681)

ROCK WALLS HOLD RUN-AWAY SOIL. *Kans. Farmer* 74: 8, illus. March 13, 1937.

Illustration shows retaining wall devised by a Kansas farmer to hold run-off soil in ravines. It is suggested that such a device could well be used on many farms as a supplement to a program designed to first check run-off soil back on the fields.

ANONYMOUS.

(1682)

SOIL EROSION PROBLEM MUST BE ATTACKED AT SOURCE, SAYS MUEHLEISEN; ADVISES PONDS. Buffalo County Jour. 76: 1, 6, illus. June 25, 1936.

Contains text of article by Gottlieb Muehleisen, soil conservation engineer, Alma, Wis., in which he advocates building of farm ponds for water storage and to control erosion.

(1683)

SOIL SAVING DAM REPAIRS GULLIES. Reclaim. and Farm Engin. 9: 40, illus. February 1926.

The experience is told of a citizen of Amity, Mo., who, by use of a soil-saving dam costing \$90 is saving \$6,000. "A soil-saving dam is in reality only the old-style earth dam with a proper outlet provided for water; it also has been called the 'sewer-pipe method' of soil saving." Advice is given for constructing the dam.

(1684)

STONE TAMES A STREAM. Capper's Farmer 48: 68, illus. February 1937.

Illustration of an engineering structure known as a sausage groin devised on a Clark County, Mo., farm by engineers of the Soil Conservation Service.

(1685)

TURBULENT FLOW FROM DAM QUELLED BY SPILLWAY JETS. Pop. Mech. 66: 208, illus. August 1936.

Description of a method for withstanding erosive forces which "quells turbulent flow by piping eight small jets of water through dam at bottom of spillway, just enough to maintain 'hydraulic jump'—smooth flow of water away from dam. This method is being used on soil conservation dam near Phoenix, Ariz. Jets eight inches in diameter suffice to smoothen out stream below 200-foot spillway."

ATCHISON, H. J.

(1686)

PRACTICAL TIPS IN THE CAMPAIGN OF DAM-BUILDING. Farmer's Weekly 53: 1065-1067, illus. June 16, 1937.

The author expresses the opinion that in South Africa dams cause erosion rather than prevent it. He illustrates how dam building and anti-soil-erosion work can be combined.

BAKER, W. H.

(1687)

THE SOIL SAVING DAM. Mo. Agr. Col. Ext. Cir. 14, 4 pp. 1917.

"This circular describes and illustrates the construction of dams, the purpose of which is to hasten the filling up of washed ditches on farms by preventing the sudden run-off of storm water."—Expt. Sta. Rec. 37: 286. 1917.

BAUMANN, PAUL.

(1688)

THE FUNCTION AND DESIGN OF CHECK DAMS; DISCUSSING THE FORM OF THE STRUCTURES AND THEIR IMPORTANCE IN SOIL EROSION CONTROL. Civ. Engin. 6: 355-358, illus. June 1936.

Gives 10 practical rules for designing check dams.

BROWN, C. B.

(1689)

KEEP THE UNDERGROUND RESERVOIRS FULL. Ariz. Cattleman and Farmer 12: 1, 8, illus. August 20, 1929.

"To a large extent water is the life of our country . . . we have extensive underground pools and water-bearing stratas which are capable of holding an immense amount of water. It is to keep these underground reservoirs filled that our interest and activity should be centered." Development of floodwater irrigation and construction of small reservoirs is urged.

CAMPBELL, F. B.

(1690)

MODIFIED SOIL CONTROL PROPOSED FOR ROLLED-FILL DAM CONSTRUCTION. Engin. News-Rec. 116: 158-159, illus. January 30, 1936.

Experience with the Proctor method of soil control on the Sutherland Reservoir indicates some desirable changes for speeding work without loss of efficiency.

- CHAMBERS, C. C. (1691)
MUSKINGUM RIVER CONSERVATION PROGRAM BEGINS IN EASTERN OHIO. Engin. News-Rec. 112: 799-801, illus. June 21, 1934.
The plan and detailed engineering studies of the flood-control and water-conservation project in Ohio are discussed. A map showing 14 tentatively selected reservoir sites accompanies the article.
- CHAPLER, J. B., and CRAIG, H. E.
PLANS AND INSTRUCTIONS, INSTALLATION AND ARRANGEMENT, SOIL SAVING DAMS, HEAD CONTROL STRUCTURES. Soil Erosion Serv. (Santa Paula, Calif.) 78 pp., illus. 1934. [Mimeographed.]
"This pamphlet has been prepared in order that everyone concerned with the installation and arrangement of soil saving and head control structures shall have a clear and concise knowledge of their purpose, construction, and degree of permanence."
- CLARK, MARION W. (1693)
FARM PONDS IN MISSOURI. Mo. Col. Agr. Ext. Cir. 351, 11 pp. 1936.
"Ponds as a source of water for livestock may be used with success in uplands throughout the State with the possible exceptions of the southern slopes of the Ozark region. However, some modifications in construction will be found necessary to prevent seepage through the pond dam in extreme northwest Missouri and some localized areas of sandy soils." Gives instructions on the construction of dams and spillways and data on the maintenance of ponds.
- DAVIS, CECIL N. (1694)
WILDLIFE-SAVING FARM PONDS OF MISSOURI. Soil Conserv. 2: 153-154, 159, illus. January 1937.
Gives data and instructions for turning gullies into ponds by means of dams. Also considers the revegetation of raw areas on the dam and the edges of the borrow pit.
- DIXON, G. G. (1695)
STUDIES ON PREVENTION OF SCOUR BELOW OVERFALL DAMS. Engin. News-Rec. 100: 696-698, illus. May 3, 1928.
The results of studies made in connection with the design of the Mineral Ridge dam of the Mahoning Valley Sanitary District in Ohio are given. Various types of tail-bay designs, with a view to preventing erosion in the lower channel, are illustrated.
- DOGGETT, DENZIL. (1696)
PRACTICAL SOIL MECHANICS FOR SMALL DAMS. Engin. News-Rec. 118: 409-412, illus. March 18, 1937.
The author describes practices employed by the Indiana Department of Conservation in building some 30 small earth dams since 1928.
- FORTIER, SAMUEL. (1697)
EARTHEN DAMS. Utah Agr. Expt. Sta. Bull. 46, 56 pp., illus. 1896.
"This bulletin discusses the character of material used in earthen dams, methods of making a compact embankment and of constructing core walls, the dimensions of reservoir embankments, slope paving, outlet pipes and conduits, waste weirs or overflows, and state supervision of dams and reservoirs . . . The Connecticut and Idaho laws relating to dams and reservoirs are given in the Appendix."—Expt. Sta. Rec. 8: 934. 1896-97.
- FARM RESERVOIRS. (1698)
U. S. Dept. Agr. Farmers' Bull. 828, 36 pp., illus. 1917.
"This bulletin gives practical information to those who intend to build or are operating farm reservoirs. The chief features of such structures are discussed first, without regard to any particular kind, and afterwards, the various kinds which are adapted to the storage of water on farms are described."
- FOX, H. K. (1699)
SIMPLE TIMBER STRUCTURE TO PREVENT EROSION. Engin. and Contract. 68: 530, illus. December, 1929.
The author describes the energy-dissipating chamber of the San Joaquin Light & Power Corporation at Fresno, Calif., built as an emergency struc-

ture in connection with a concrete-lined ditch constructed to divert water into a reservoir.

- Fox, J. J. (1700)
THE LIFE BLOOD OF CALIFORNIA. Pacific Rural Press 130: 573. November 30, 1935.

"The Sacramento river and its tributaries are to northern California what the aorta is to the human anatomy." The project for the damming of the united Sacramento and Pitt Rivers, to be undertaken in the cause of water conservation, is described.

- GILLETTE, H. P. (1701)
NOVEL AND ECONOMIC METHOD OF CONTROLLING STREAMS. Engin. and Contract. 50: 339-340, illus. October 9, 1918.

In discussing the inventor of the system of check dams, the author says: "His experience in attempting to prevent erosion by torrential streams led him to the conclusion that the greatest mistake by engineers is to direct their entire attention to protecting the banks. Ordinarily no attempt is made to regulate the gradient of the bottom of a stream; but if the bottom is not held in place, undermining of any bank protecting structures is almost certain to occur . . ." The plan involves: (1) Control of the bottom by a series of cheap step dams; (2) control of sides by step dams; and (3) use of posts and wire netting for dam building, and automatic filling in back of the dams with sand and gravel carried by the stream.

- HARDENBERGH, W. A. (1702)
CONSTRUCTING PROCEDURE WITH SMALL EARTH DAMS. Pub. Works 67: 25-26, illus. March 1936.

This article treats of modern practices in dam construction through spreading and compacting. Measures for preventing erosion on the face of a dam are discussed.

- (1703)
FACTORS IN THE DESIGN AND CONSTRUCTION OF SMALL EARTH DAMS. Pub. Works 66: 23-29, illus. December 1935.

- (1704)
MATERIALS FOR THE CONSTRUCTION OF EARTH DAMS. Pub. Works 67: 17-18. February 1936.

The author discusses soil-moisture content with regard to stability. Equipment necessary to perform tests for control during construction of earth dams is mentioned and cost of equipment given.

- (1705)
SPILLWAY CAPACITY AND RUNOFF ESTIMATES FOR SMALL DAMS. Pub. Works 67: 15-16. January 1936.

Formulas and directions for construction of spillways for earth dams on large and small watersheds are presented.

- HARRIS, E. G. (1706)
A STUDY ON REINFORCED CONCRETE DAMS. Mo. Univ. School Mines and Metall. Tech. Bull. 8 (3): 56, illus. 1925.

A comparative study is presented of trapezoidal gravity, arched, horizontal-beam, and vertical-beam dams, one of the purposes being to present a method of study and design of the fourth type. Vertical-beam action is considered more logical for arched dams than cantilever action.

- HENSHAW, GEORGE H. (1707)
THE IMPROVEMENT OF CHANNELS IN SEDIMENTARY RIVERS. Amer. Soc. Civ. Engin. Trans. 20: 109-117, illus. 1889.

Proposes and discusses two methods for use on the Mississippi River: (1) The use of solid dams or barriers permeable to water extending from the shore to the channel for the double purpose of directing the latter into its desired course and accumulating sediment at its sides; and (2) a device consisting of a loose-woven permeable fence, made of light and flexible material, such as willow, to supply artificially to the bottom the element of resistance to erosion essential to the ideal river.

- HILL, C. EDWIN. (1708)
WHISKER DAMS IN THE NORTHWEST. Soil Conserv. 2: 174-175, 180, illus.
February 1937.

Advocates and explains construction of whisker dams. "These dams perform several functions. They are built primarily to slow up the water on its pell-mell course down the gully and thus prevent washing out of the new grass seedlings."

- HILL, L. C. (1709)
SOLVING THE SILT PROBLEM. Engin. Rec. 70: 609-610. December 5, 1914.

The author suggests the construction of reservoirs for muddy streams of the Southwest, refuting criticism to the effect that siltation of reservoirs does not justify the cost of construction. "This criticism is not well founded if a life of from three hundred to a thousand years is considered as fairly justifying the construction of the works." Discusses construction of the Elephant Butte and the Roosevelt dams.

- HOFFMAN, M. H., AND TURNER, A. W. (1710)
THE PREVENTION OF SOIL EROSION—V: THE USE OF CONCRETE. Iowa Agr. Col.
Ext. Bull. 80, 8 pp., illus. 1921.

"In this number of this series (E. S. R., 44. p. 316) the use of solid dams of concrete or masonry for checking erosion is described and diagrammatically illustrated. It is pointed out that a dam should be built with a footing several feet below the bottom of the ditch on a firm foundation with the ends well out into the bank, and the middle considerably lower than the ends, and with a down stream curvature of about 120°. The importance of concrete boxes for road culverts where permissible is also recommended."—Expt. Sta. Rec. 45: 21. 1921.

- HUTTON, M. L. (1711)

UPSTREAM RESERVOIRS. MANY SMALL LAKES AND PONDS AT THE HEADWATERS ARE OF PRIMARY IMPORTANCE. Amer. Wildlife 26: 39, 46-47. May-June 1937.

Discusses five types of upstream reservoirs: (1) Natural lakes and their preservation and improvement; (2) pools created in streams; (3) artificial lakes; (4) farm ponds; and (5) underground waters. Cites interest of Iowa Conservation Commission in impounding water and quotes letter from R. W. Oberlin concerning work in Missouri and Iowa in the Big Creek Watershed. Presented at the meeting of the Iowa Engineering Society, March 3, 1937.

- JONES, E. R. (1712)
DROP INLET SOIL SAVING DAMS. Agr. Engin. 18: 349-351, illus. August 1937.

"Farmers have become discouraged with temporary check dams made of woven wire, or layered brush wired down . . . Such dams create an overfall which causes their own undermining and destruction." Table 1 shows the right spillway for the right place, and table 2 shows the type of structure required. "Drop inlets and head spillways lend themselves well to use as highway culverts."

- KESSLER, L. H. (1713)
EROSION CONTROL STRUCTURES—DROP INLETS AND SPILLWAYS. Wis. Agr. Expt.
Sta. Research Bull. 122, 66 pp., illus. 1934.

"This bulletin presents the results of an analysis of the hydraulic characteristics of certain types of concrete conduits, flumes, and spillways used with earth-filled, soil-saving dams for erosion control. It was prepared by the Agricultural Experiment Station and the Engineering Experiment Station of the University of Wisconsin in cooperation with the U. S. D. A. Forest Service and the Wisconsin Civil Works Administration."—Expt. Sta. Rec. 72: 700. 1935.

- (1714)
RESULTS OF EXPERIMENTS ON HYDRAULICS OF DROP INLETS AND OTHER EROSION
CONTROL STRUCTURES. Agr. Engin. 18: 253-258, illus. June 1937.

This paper was presented before the Soil and Water Conservation Division of the American Society of Agricultural Engineers at Chicago, December 4, 1936. "Obviously, models had to be used in the experimental work in place of the prototype, but by interpreting the data according to the laws of

hydraulic similitude, it is believed the hydraulic characteristics and behaviour of the several types of structures investigated are definitely known for practical work."

KLEIN, JACK. (1715)

MIDDLEWEST TO BE DAMMED. Calif. Cult. 83: 619, 635. August 29, 1936.

On water conservation in Texas, Oklahoma, and Kansas.

KNAPPEN, T. T., AND PHILIPPS, R. R. (1716)

PRACTICAL SOIL MECHANICS AT MUSKINGUM—I. Engin. News-Rec. 116: 453-455, illus. March 26, 1936.

"By analyses and model tests the engineers of the Muskingum River flood-control works are adapting soils of widely different geological character to earth-dam construction with a close approach to predetermined exactness."

LEE, C. H. (1717)

SELECTION OF MATERIALS FOR ROLLED-FILL EARTH DAMS. Amer. Soc. Civ. Engin. Proc. 62: 1025-1042. September 1936.

"This paper is confined to a discussion of earth testing as an aid to the selection of materials. Pertinent fundamental principles of soil technology as developed from the latest research and practice are drawn upon as a basis for conclusions. These principles are supplemented by certain research findings in concrete technology."

LEWIS, M. R. (1718)

RESERVOIRS FOR FARM USE. U. S. Dept. Agr. Farmers' Bull. 1703, 16 pp., illus. June 1933.

This bulletin describes the construction and maintenance of farm reservoirs used to supply water for irrigation, livestock, and domestic use, and as swimming pools and fish ponds. Where only a small quantity of water is to be stored and the required dam is low, the simple instructions given in this bulletin should enable a farmer to plan and build his own reservoir.

LIPPINCOTT, J. B. (1719)

DISCUSSION OF CHECK DAMS. Calif. Citrogr. 20: 266, 298, illus. July 1935.

Check dams and their construction are discussed with excerpts from various other published reports on the subject.

LIVINGSTON, L. F. (1720)

DAMS OR PONDS TO CONSERVE WATER. Agr. Engin. 16: 115. March 1935.

Combating water shortage by means of dams on streams, or by making ponds, water holes, or "tanks" is recommended. Instructions for pond blasting with dynamite are given.

(1721)

FEDERAL AGENCIES USE DYNAMITE TO BLAST SPRINGS TO PROVIDE WATER FOR CATTLE ON WESTERN RANGES. E. I. Du Pont de Nemours & Co. Agr. News Letter 5: 114-115. June 1937.

"Blasting to check soil erosion may seem far-fetched, yet that is exactly what the Soil Conservation Service is doing in the John Day range country of Northern Oregon, according to the U. S. Department of Agriculture." Directions for using dynamite are given.

(1722)

PONDS MUST HAVE DEPTH TO WITHSTAND DROUGHT. E. I. Du Pont de Nemours & Co. Agr. News Letter 4: 181-183. December 1936.

Preparedness for future droughts through storing water in ponds is discussed. Advice on dynamite blasting and specifications for post-hole loading is given. "Ponds up to 40 feet wide can be shot economically and easily in wet soils." A table for determining the quantity of dynamite to use in blasting ponds is shown.

LOWDERMILK, W. C., AND BARNES, F. F. (1723)

STOCK PONDS IN THE GREAT PLAINS DROUGHT AREA. Soil Conserv. 2: 44-47, 58, illus. September 1936.

The authors stress the relationship between soil and water conservation. They show the necessity for properly designed small reservoirs and farm ponds to store water during dry periods such as the drought of July 1936 in

the Great Plains. The importance of seepage and evaporation losses and methods of reducing them are discussed.

McPHERTERS, W. H.

(1724)

THE FARM POND. Okla. Agr. Col. Ext. Cir. 175, 7 pp., illus. 1935.

Diagrams for construction of ponds and dams are shown. "A pond is usually filled in by the rain water which falls on the watershed drained by the ravine where the dam is made; however, in many cases it is possible to fill it with water falling on the opposite slope by carrying the water around the hill with terraces. Terrace feeding is an excellent method because the pond will not fill up so quickly with mud. Other methods of securing water for ponds are drain ways from springs and hillside seeps."

(1725)

THE FARM POND AND ITS USES. ADEQUATE WATER SUPPLY WILL NOT ONLY SERVE THE FARM'S NEEDS, BUT WILL AID NATIONAL FLOOD CONTROL PROGRAM. Farm and Ranch 55: 4, 11-12, illus. October 1, 1936.

Illustrations of top and cross section show how dam and spillway for the farm pond are built. Tables give dimensions of the dam and size for spillways along with data on proper location and economic value of farm ponds.

MATTHES, G. H.

(1726)

PROBLEMS AT CONCHAS DAM. ADVANCE STUDIES ON MATERIALS, DESIGN, WATER SUPPLY, AND OPERATION. Civ. Engin. 6: 437-441, illus. July 1936.

Conchas Dam, located on the South Canadian River just inside the border of New Mexico, and adjacent to the Panhandle of Texas, is discussed. Intended primarily for flood control, it will have a generous capacity available for farm irrigation, and incidentally for municipal uses.

MEAD, ELWOOD.

(1727)

SOME TYPICAL RESERVOIRS IN THE ROCKY MOUNTAIN STATES. U. S. Dept. Agr. Yearbook 1901: 415-430, illus. 1902.

"It is the purpose of this paper to describe some typical reservoirs of the Rocky Mountain States to show how widely they differ from the usual idea that a reservoir requires a lofty dam across a remote and precipitous mountain canyon. The operation of these reservoirs will also be outlined in order to show when they are filled, when the water is used, and the benefits derived from them."

MEERTEN, E. J. VAN

(1728)

DAMMING OF SLOOTS WITH STONE AND CONCRETE WALLS. Farming in So. Africa 6: 29-30, illus. April 1931.

One of the chief methods of combating soil erosion is to dam gullies so as to divert and distribute flood water on the fields. Successful efforts of a farmer in the Cape Province is described.

(1729)

SPECIFICATIONS OF WORK TO BE DONE IN BUILDING A DAM. Farming in So. Africa 11: 453-454, illus. November 1936.

Instructions are given as to site, foundations, outlet pipe, spillway channel, material, etc.

(1730)

WATERHOLES FOR THE CONSERVATION OF FLOOD-WATER ON FARMS. Farming in So. Africa 12: 5, 22, illus. January 1937.

"A description is given of the standardized waterhole in respect of which the Department of Agriculture and Forestry is prepared to grant financial assistance under the Soil-Erosion Scheme."

METCALF, H. J.

(1731)

SOIL EROSION DAM. Hoard's Dairyman 62: 281, illus. September 30, 1921.

Construction of a dam 32 feet long, 18 feet wide, and 15 feet high across an Iowa farm-land gully is described. "Many of the upland soils have eroded to such an extent that the unproductive subsoil is exposed . . . it is hard to get legumes to grow on these hills that are lacking in plant food and it will take years of work to bring this soil back to productivity."

- MILLER, E. E. (1732)
TO STOP GULLIES. *Country Gent.* 81: 264. February 5, 1916.

The writer advocates the use of cheap and simple dams of stones, timber, or brush, the planting of trees in the bottom, or on the sides of gullies, with a soil-building grass to grow with them, and the construction of terraces for preventing and checking erosion.

- MONSON, O. W. (1733)
CONSERVATION OF WATER BY MEANS OF STORAGE RESERVOIRS, DIVERSION DAMS, CONTOUR DIKES, AND DITCHES. *Mont. Agr. Expt. Sta. Bull.* 301, 48 pp., illus. 1935.

This bulletin treats of the development of flood irrigation; selection of reservoir sites with reference to storage capacity, drainage area, suitability of soil, etc.; construction of earth dams; diversion dam building; contour dikes for flood irrigation; contour ditches. In his summary the writer states that "many small storage reservoirs with earth-fill dams built by the farmer's own labor are in successful operation in several parts of the State. Some of these store water for irrigation, others provide water for livestock on the range." In an appendix are listed storage dams, diversion dams, stock reservoirs with the year built, and all particulars.

- MUEHLEISEN, G. (1734)
THE POROUS DAM METHOD OF EROSION CONTROL. *Agr. Engin.* 7: 350-351, illus. October 1926.

In describing the advantages of this method of erosion control the author says: "The porous dam is not limited in its usefulness to the filling up of gullies and valleys. In the case of valleys subject to occasional floods porous dams can be so designed and installed as to have the effect, not only of holding the main velocity and flow of the stream where desired to avoid the damage to land along the bank, but also to insure the deposit of a layer of silt, thereby enhancing the fertility of the soil by recapturing some of the material eroded farther upstream."

- MURDOCK, H. E., AND FERGUSON, B. (1735)
FARMERS' STORAGE RESERVOIRS, DIVERSION DAMS AND DIKES. *Mont. Agr. Col. Ext. Bull.* 59, 18 pp., illus. 1923.

Advice on choosing reservoir sites and their construction as well as the building of diversion dams and contour dikes is given. "The first thing is to get the water so that it is available for use; the next is to use it efficiently."

- NAGEL, W. O., AND CLARK, M. W. (1736)
IMPROVEMENT OF FARM PONDS AND WATERSHEDS FOR EROSION CONTROL AND WILDLIFE PRODUCTION. *Mo. Agr. Col. Ext. Cir.* 361, 11 pp., illus. 1937.

Discusses improvement and protection of existing ponds and the construction of ponds to benefit wildlife on waste areas.

- OBERLIN, R. W. (1737)
FARM PONDS PASS CRITICAL TESTS. *Soil Conserv.* 2: 210-211, illus. March 1937.

The author discusses the storage capacity of ponds as a means for adequate water supply on farms, especially in certain areas throughout the Middle West.

- OLMSTED, F. H. (1738)
CONTROL OF MOUNTAIN TORRENTS BY CHECK DAMS. *Engin. News* 75: 314-315, illus. February 17, 1916.

Referring to the flood damage sustained in Los Angeles County, the author advocates an adequate control policy. "In addition to the retarding dams recommended by me, I also wish to emphasize the need of the construction of a considerable number of rockfill dams 20 to 50 ft. high, by blasting down rocks from overhead cliffs, in this way creating permanent but porous cross-structures in the cañon."

- OOSTHUIZEN, E. A. (1739)
SITES FOR DAMS UNDER THE SOIL EROSION SCHEMES. *Farming in So. Africa* 11: 158-159. April 1936.
This article is devoted principally to irrigation dams. Instructions are given for selecting the site for such a dam which, the writer contends, demands experience, discernment, and technical knowledge.
- OREGON STATE PLANNING BOARD. (1740)
DEVELOPMENT OF WATERING PLACES ON THE OREGON RANGE. *Oreg. State Planning Board*. 26 pp., illus. January 18, 1937.
A program to provide water for livestock and wildlife on the public domain and national forests of eastern Oregon.
- PROCTOR, R. R. (1741)
SOIL COMPACTION CONTROL FOR ROLLED EARTH DAM CONSTRUCTION. *Jour. Amer. Waterworks Assoc.* 28: 134-141, illus. January 1936.
Presents an outline of the fundamentals of the soil compaction control that has been developed and used by the bureau of waterworks and supply of the City of Los Angeles during the past few years. Illustrations show the Chatsworth type percolation cylinder, results of experimental compactions of a particular soil at a wide range of moisture content, and the plasticity needle in operation.
- RAMSER, C. E. (1742)
BRIEF INSTRUCTIONS ON METHODS OF GULLY CONTROL. *U. S. Bur. Agr. Engin.* 36 pp., illus. 1933.
"Technical data on gully control are given to supplement that presented in *Farmers' Bulletin* 1234 (*E. S. R.* 47: 19). Detailed drawings of check dams are given, and curves are included for use in the determination of the sizes of culverts through soil-saving dams, and tables for determining the size of notches and spillways in check and large soil-saving dams."—*Expt. Sta. Rec.* 70: 397. 1934.
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- (1743)
CAPACITY OF OUTLETS FOR EROSION-CONTROL DAMS. *Engin. News-Rec.* 112: 595-596, illus. May 10, 1934.
Diagrams and tables accompany this article showing hydraulic characteristics and discharge capacities as determined for drop-inlet pipe and box culverts used as outlets for small dams.
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- (1744)
GULLIES MAY BE FILLED AND RECLAIMED BY AID OF SMALL BRUSH DAMS. *U. S. Dept. Agr. Yearbook* 1930: 298-302, illus. 1930.
The construction of small brush dams is described briefly. The dams are of the type built at the soil-erosion experiment farm near Guthrie, Okla.
- RANSOME, FREDERICK L.
HIGH DAMS; THE VIEWPOINT OF THE GEOLOGIST. *Amer. Soc. Civ. Engin. Trans.* 95: 149-158. 1931.
Discusses factors to be taken into consideration in selecting a dam site. Some phases of geologic erosion are considered, such as the softening or disintegration of rocks in water.
- SLACK, S. B. (1746)
PREVENTING DITCH EROSION BY CHECK DAMS. *Engin. News-Rec.* 112: 469-470, illus. April 12, 1934.
Roadside ditch grades and cross sections are discussed. Check dams to reduce velocity of current in loose-soil ditches are encouraged as a means of checking erosion.
- SMITH, DWIGHT D., AND WOLFE, EMERSON. (1747)
DETENTION RESERVOIRS FOR GULLY CONTROL. *Soil Conserv.* 1: 12-13, illus. November 1935.
Data on detention reservoirs in the Big Creek watershed of Missouri.

SOUTH AFRICA DEPARTMENT OF AGRICULTURE AND FORESTRY. (1748)

ANTI-SOIL EROSION AND SMALL DAMS SCHEME. SPECIFICATIONS OF SMALL DAMS; PRELIMINARY INSPECTIONS. So. Africa Dept. Agr. and Forestry Cir. 19, 15 pp., illus. 1936.

Three schemes are outlined. Designs and specifications are given for the construction of embankments and spillways, pitching of earth walls, contours, stone-in-wire work, and masonry. Instructions are given for pegging of dam sites and spillways.

SOUTH DAKOTA STATE PLANNING BOARD. (1749)

RESETTLEMENT DAMS TO HELP FARMERS AND STOCKMEN IN SOUTHWEST COUNTIES. S. Dak. State Plan. Bd. Prog. Rept. 2: 2-3. December 1936.

SUNDERLIN, H. H., AND CLYDE, A. W. (1750)

CHECKING OVERFALLS. Iowa Agr. Col. Ext. Bull. 94, 4 pp., illus. May 1922.

"The overfall is that formation at the head of the ditch where the water falls from one level to another." Methods of control are discussed and illustrated.

— AND CLYDE, A. W. (1751)

FILLING THE LARGE DITCH. Iowa Agr. Col. Ext. Bull. 95, 4 pp., illus. May 1922.

Control methods for the formation and spreading of ditches are discussed. Brush and woven-wire dams and their construction are described and illustrated.

SWAIN, M. S. (1752)

SPACING BAFFLE DAMS IN OLD AND NEW HIGHWAY SIDE DITCHES. Engin. News-Rec. 101: 70-71. July 12, 1928.

The use of concrete in building baffle dams is advised. Formulas for best results and economy are given.

THOMAS, E. J., ROHERTY, J. N., AND MCCOLLY, H. F. (1753)

CONSTRUCTION OF SMALL DAMS FOR FARM AND COMMUNITY USE. N. Dak. Agr. Col. Ext. Cir. 154, 20 pp., illus. 1937.

The value of storing run-off water behind small dams is pointed out as a method of water conservation, possible on many farms. They provide water for livestock, decrease damage from rushing flood waters, and make it possible to irrigate small areas. "The proper location, design, construction and protection of these dams increases their usefulness, adds to their life, and insures their safety."

THOMPSON, E. E. (1754)

BUILDING THE RESERVOIR. Mont. Farmer 24: 3, illus. December 1, 1936.

Gives typical plan view of flood irrigation or stock-water-reservoir dam.

TIBBETTS, F. H. (1755)

EARTHQUAKE-PROOF EARTH DAMS. Engin. News-Rec. 117: 10-13, illus. July 2, 1936.

The author states that "satisfactory earth dams can be built anywhere using any kind of material . . . provided (1) the upstream portion including the cutoff trench extending into the impervious foundation material is made impervious and (2) the rear portion has sufficient bulk and porosity so it will drain off, without sloughing, any water which seeps through the impervious portion . . . Five storage dams on water-deposited soils over the shattered and shaken bed rock between the historic San Andreas and Hayward faults in California have earthquake-resisting sections."

TOMSON, F. D. (1756)

THE COMING OF FARM PONDS. Country Gent. 106: 95. May 1936.

The author, a Kansas stockman, discusses briefly the advisability of making ponds on stock farms and states that there is need for 10,000 more ponds in Kansas, "not so much with reference to water supply but an erosion preventive."

TSCHUDY, L. C.

(1757)

DAMS IMPOUND STATE'S WATER AGAINST TIME OF DROUGHT. Soil Conserv. 1: 11, 14, illus. September 1935.

A brief description of soil conservation work in North Dakota carried out by the Civilian Conservation Corps under the supervision of the United States Forest Service and the Soil Conservation Service.

LAKES IN RURAL COMMUNITIES. Agr. Engin. 17: 209-211, illus. May 1936. (1758)

Paper presented before Soil and Water Conservation Division of the American Society of Agricultural Engineers, Chicago, December 5, 1935, deals with water and soil conservation policies and problems in the northern portion of Great Plains States. Gives brief picture of needs in rural communities for lakes where grazing land covers thousands of acres, practically all of which are overgrazed. "Overgrazed land blows, and soil losses increase with poor grazing land resulting. Dams spotted at needed places help to result in more efficient use of the grazing land . . . Dams located in flat bottom land help to develop yearly alfalfa and wild hay supplies. Dams located near cities help to raise the water table and result in public benefit to communities." Author describes the ideal design for small earthen dams used in construction of small lakes.

WATER CONSERVATION ENGINEERING IN THE NORTHERN GREAT PLAINS. Agr. Engin. 18: 63-64, 67, illus. February 1937. (1759)

This paper was presented before the Soil and Water Conservation Division of the American Society of Agricultural Engineers at Chicago, Ill., December 3, 1936, and deals chiefly with the engineering phases of stock-watering reservoirs, flood irrigation, and water-conservation dams.

, and SUTTON, J. G. (1760)
BRIEF INSTRUCTIONS FOR THE DESIGN AND CONSTRUCTION OF SMALL DAMS FOR EMERGENCY CONSERVATION WORK IN NORTH DAKOTA. U. S. Soil Conserv. Serv. SCS-EP-8, 23 pp., illus. 1935. [Mimeographed.]

The designs and specifications contained in this report are especially suited to work in North Dakota. They "should be used cautiously for work in other states." Data are also given on the protection of earth dams, spillway designs, and the determination of spillway capacity.

UNITED STATES BUREAU OF RECLAMATION. (1761)
LARGE RESERVOIRS IN THE UNITED STATES. Reclam. Era 26: 83-89. April 1936.

Discussion of the important reservoirs of the United States, including data as to location, rivers, construction, and year completed, purpose of water storage, capacity, area, length, average width, shore-line mileage, and projected plans for control of silt deposits by erosion-control operations.

WADSWORTH, R. G. (1762)
THREE TYPES OF DESIGN IN CALIFORNIA FLOOD CONTROL DAM. Engin. News-Rec. 107: 46-49, illus. July 9, 1931.

Description is given of the variable-radius arch with gravity abutments, and straight and curved standard gravity sections employed in Hogan Dam on the Calaveras River.

WARNE, W. E. (1763)
BIG JOB OF HARNESSING WESTERN WATERS. Nation's Agr. 11: 4-5, 28, illus. April 1936.

Tells the story of irrigation in the arid West and Southwest, with detailed description of the construction of Boulder Dam in the Colorado River.

WATERMANN, E. L., MAVIS, F. T., and SOUCEK, E. (1764)
FUNDAMENTAL HYDROLOGIC CONSIDERATIONS FOR IMPOUNDING RESERVOIRS IN MIDDLE WEST. Jour. Amer. Waterworks Assoc. 28: 193-206, illus. February 1936.

The purpose of this paper is (1) to discuss briefly some of the hydrologic factors which should be considered in designing impounding reservoirs on

small drainage areas, (2) to present an analysis of stream-flow records collected on Ralston Creek, near Iowa City from 1924-25, (3) to compare this analysis with similar data for eastern streams, and (4) to present tentative recommendations for the design of small impounding reservoirs in the Midwest.

WINSOR, L. M. (1765)

CHECK DAMS CONTROL DEBRIS MOVEMENTS ON MOUNTAIN STREAMS. DAMAGE FROM DEBRIS CARRIED ONTO VALUABLE LAND LARGELY ELIMINATED BY CONSTRUCTION OF INEXPENSIVE DAMS TO FORM STILLING POOLS. Engin. News-Rec. 107: 290-291, illus. August 20, 1931.

Devastating floods in the Wasatch Mountains of Utah prompted an intensive study of the flood problem to determine to what extent such floods may be eliminated and mountain streams controlled during periods of high water. "The control works adopted are extremely simple. A gravel barrier is constructed across the streambed at a location such that the stream above the barrier may spread over an area several times the normal width of the channel. This results in retardation of the velocity of the water some distance above the barrier and produces a pond of still water immediately above it."

WOOD, IVAN D. (1766)

MORE WAYS TO STOP SOIL WASHING. Successful Farming 23: 15, illus. May 1925.

Describes the construction of rock and concrete dams for gully control. Brush and wire dams are also described.

WYCKOFF, WAYNE W. (1767)

DESIGN OF EARTH FILL DAMS. Jour. Amer. Waterworks Assoc. 28: 127-133, illus. January 1936.

Sets forth principles for designing earth fill dams that are stable of structure and relatively watertight. Includes directions for field and laboratory tests of material, exploration pits to be sunk at a sufficient number of places throughout the foundation site, the construction of cut-off walls, protection of the upstream face of the dam, spillway capacity, and let-out works.

TERRACES AND OUTLETS

ANONYMOUS. (1768)

CHECKING SOIL WASHING. Amer. Fruit Grower 45: 24, 25, illus. September 1925.

This article describes checking of gully and sheet erosion by terraces. Instructions for building terraces and a list of necessary implements are included. Brush dams are also discussed.

(1769)

CONTROLLING RUN-OFF WATER. Prog. Farmer (Ky.-Tenn. ed.) 51: 65, illus. December 1936.

Illustrations show three forms of control at the terrace outlet. Unless water is controlled at the terrace outlet, much erosion will take place where the water leaves the terrace.

(1770)

EXAMPLES OF MONEY-MAKING TERRACES. Farm and Ranch 53: 4, illus. February 15, 1934.

Several Texas farmers, reporting to county agents, showed that proper terracing increased the yields of their crops and lowered the unit cost of production.

(1771)

EXPERIENCE IN DRAINING FARM LAND MADE HIM DOUBT TERRACES. Kans. Farmer 74: 10, illus. June 20, 1936.

The experience is related of one Kansas farmer in controlling gullies by terrace and contour methods. Sudan grass, because of its thick root growth, is suggested for holding the soil.

ANONYMOUS.

(1772)
FIGHTING EROSION IN THE SOUTHWEST. *Farm Impl. News* 55: 18, illus.
November 8, 1934.

Nine hundred miles of terraces winding through Kansas, Oklahoma, and Texas hills, built to preserve land values for future generations are described. Types of machinery used and the cooperation of the Aetna Life Insurance Co. of Hartford, Conn., are outlined.

(1773)
HOW FARM TERRACES ARE BUILT. *Wallaces' Farmer* 55: 1731, illus. November 1, 1930.

"If anybody puts on a terracing demonstration in your neighborhood, it will be worth your time to go and watch it. Even though you may be living on a fairly level farm, erosion is one of your enemies, and a knowledge of terracing can help you defend your soil against it . . . Every farm presents its own terracing problem . . ." The writer discusses in detail the evils, slopes, gutters, drainage, and various conditions encountered, with directions for the construction of farm terraces and a list of practical "don't's" for the builder.

(1774)
HOW TERRACER IS MADE AND WORKS. *Mo. Ruralist* 77: 17. June 13, 1936.

A V-terraccer developed at Oklahoma Agricultural Experiment Station, by W. H. McPheters, has proved satisfactory for use by farmers. Cost of building the machine is \$6 to \$10.

(1775)
MAGEE, MISSISSIPPI, EFFECTIVELY SOLVES TERRACING PROBLEM. *Bur. Farmer* [Miss. Ed.] 5: 12, illus. November 1929.

Simpson County farmers take care of their terracing needs through community exchange of equipment and labor. Nearly "six years ago farmers realized that terraces alone would save their fertile soil from utter destruction."

(1776)
MORE FLEXIBLE MACHINES NEEDED FOR TERRACING, SAYS SHEDD. *Impl. and Tractor* 51: 8. June 27, 1936. [Also in *Farm Impl. News* 57 (14): 33. July 2, 1936, under title, *Implements on Terraced Lands.*]

The address by C. K. Shedd, United States Bureau of Agricultural Engineering at meeting of American Society of Agricultural Engineers, Estes Park, Colo., June 23, 1936, is summarized. Corn-planting and cultivating machinery on terraced land are discussed.

(1777)
THE NECESSITY FOR TERRACING. *Prog. Farmer* (Car.-Va. Ed.) 37: 12. December 2, 1922.

This article discusses soil erosion in the South and urges terracing as a control measure. Various cropping systems to supplement terracing are recommended.

(1778)
A NEW MACHINE THAT MAY PLAY A GREAT PART IN THE BATTLE AGAINST SOIL EROSION IS DESCRIBED IN A PATENT RECENTLY GRANTED TO EDGAR V. COLLINS, AMES, IOWA. *Science* 85: 14. June 4, 1937.

This article describes a new machine that "will throw up in the rough 10 miles of erosion-checking terraces in one hour."

(1779)
PASTURE TERRACING A JOB FOR THE FARM POWER CONTRACTOR. *Agr. Leader's Digest* 17: 62-63. October 1936.

The author cites an example of erosion control in Peoria, Ill., by pasture terracing. He tells how 5,130 feet of terraces were built in 13 hours at a cost of \$43.55.

(1780)
SODDED TERRACE OUTLET CHANNELS HOLD. *Farm and Ranch* 55: 17. December 1, 1933.

Inspection after an 8.01-inch rain revealed that farms near Waco, Tex., cooperating with the Soil Conservation Service, suffered no damage.

ANONYMOUS.

(1781)

SOIL EROSION FOUGHT WITH A PUBLIC WORKS FUND GRANT OF \$5,000,000. Science 78: [Sup. 9]. August 4, 1933.

"Terracing is the means to be used in controlling the erosion. The Government will supply the technical direction and terracing equipment, and the landowners will provide the power and labor." The Department of Agriculture estimates that "75 percent of the cultivated land in the United States is seriously affected by soil erosion. More than 17,000,000 acres of formerly cultivated land have been destroyed by erosion."

(1782)

SOIL-SAVING TERRACES. Wallaces' Farmer 42: 1639, illus. December 7, 1917.

This article discusses the gullies of Missouri and the success of the Mangum terrace. Simple instructions are given for the construction of soil-saving terraces.

(1783)

SOME COMPARISONS OF MOISTURE PENETRATIONS ON TREATED AND UNTREATED LAND FOLLOWING MAY RAINS. High Plains Conserv., pp. 5-7. June 1936.

Contains reports on 13 localities of Texas, Oklahoma, New Mexico, Kansas, and Colorado. Comparisons are made between penetrations on terraced and unterraced lands.

(1784)

STEEL TERRACING MACHINE PREVENTS SOIL EROSION. Pop. Mech. 32: 57-58, illus. July 1919.

This article describes a terracing machine designed for ditching and grading.

(1785)

TERRACE CULTIVATION. Jour. Jamaica Agr. Soc. 23: 14, January 1921; 25: 247. July 1921.

On the economical use of steep hillsides by terrace cultivation.

(1786)

TERRACE OUTLETS. Capper's Farmer 47: 49, illus. April 1936.

The writer describes a masonry baffle constructed under supervision of the Soil Erosion Service on W. G. Kennick's farm in Payne County, Okla. It is one of a series in a shallow channel constructed to receive water from terraces from both sides. The baffles work in the same way that similar structures do in properly constructed roadside ditches. With a baffle of this kind across the water course at intervals, the flow is checked and does not have an opportunity to scour out the gully.

(1787)

TERRACES BROUGHT JERSEYS. Capper's Farmer 45: 18. January 1934.

"Mangum terraces enabled S. Tom Caruthers, Fulton County, Ark., to add a profitable dairy project to his farming operations. At an outlay of not more than \$1.50 an acre, he constructed terraces and leveled the gullies so that soil washing was stopped and the land cultivated at a profit.

(1788)

TERRACES INCREASE CROP YIELDS. Prog. Farmer (Tex. Ed.) 52: 24, illus. February 1937.

"Terraces will increase crop yields on the average by at least one-fourth and at the same time prevent soil erosion," says a Shackelford County, Tex., farmer.

(1789)

TERRACES SUPREMELY IMPORTANT IN THE SOUTH. Prog. Farmer (Car.-Va. Ed.) 38: 1173. December 1, 1933.

Estimates the soil losses in Tennessee and stresses the value of terracing as a control measure. Figures on increased land value due to terracing are given.

(1790)

TERRACING FOR WATER CONSERVATION. Farm and Ranch 53: 24. February 15, 1934.

Data on the income derived from cotton on a tract of 7.57 acres on the Spur Experiment Station in Texas. "This tract of land is a part of a

tract used in the water conservation experiments at the Spur Station, and does not represent normal production for that section, but does show what can be done where the proper use is made of water . . ."

ANONYMOUS.

(1791)

TERRACING PREVENTS LOSS OF RICH TOPSOIL FROM ERODING FARMS. Ag-Ex News 3: 12, illus. January 1934.

The level and Mangum types of terraces are described by the author who says, "terraces quickly pay for themselves in increased yields and enhanced value of lands."

(1792)

TERRACING WORK GETTING UNDER BIG HEADWAY IN STATE. Bur. Farmer (Tenn. Ed.) 10: 8. March 1935.

It is stated that terracing work is the first step toward a real soil-building program. Work contemplated in Maury County, Tenn., is outlined, with costs and results.

(1793)

TOPICS OF THE TIMES. N. Y. Times 86: 20. January 7, 1937.

This article discusses terraces as constructed by the Inca Indians of ancient Peru. The writer observes that soil erosion was a contributing factor to their eventual extinction.

(1794)

TREES ON TERRACES. Capper's Farmer 48: 22. April 1937.

The owner of one of the largest apple orchards in Delaware County, Okla., tells why, if he were doing it over, he would lay out a system of terraces that would enable him to plant all of his trees on terraces.

(1795)

THE WATER GOES ROUND AND ROUND. Pacific Rural Press 131: 344, illus. March 14, 1936.

"The sort of terraces, which most ranches need, are simply planned, easily made, and last a good while. They prevent erosion and retard water, putting it into the soil."

ALFORD, G. H.

(1796)

TERRACE YOUR LAND AND SAVE YOUR SOIL. Prog. Farmer (Car.-Va. Ed.) 39: 1359, illus. December 27, 1924.

Broad-base terraces help bring washed fields back into production, the writer maintains. No trouble is experienced in running cultivators, mowers, binders, or wagons on the terraces. Information on terrace construction and location is given.

AMERICAN SOCIETY OF AGRICULTURAL ENGINEERS.

(1797)

TERRACING MACHINERY AND TERRACING CONSTRUCTION PRACTICES. Agr. Engin. 17: 47-54, illus. February 1936.

A symposium comprising papers presented before the Soil and Water Conservation and Power and Machinery Divisions of the American Society of Agricultural Engineers at Chicago, December 5, 1935: In the Southwest Area, by W. Baird; In the Corn Belt Area, by V. D. Young; In the Great Plains Area, by Raymond R. Drake; In the Pacific Northwest Area, by P. C. McGrew; Factors Affecting Terracing Costs, by G. F. Hoover; Problems in Determining Terracing Costs, by W. A. Clegg; Types of Machines and Selling Policies, by J. W. Carpenter, Jr.

ANDREWS, H. W.

(1798)

TERRACES, LEGUMES, AND LIVESTOCK. Agr. Leaders' Digest 17: 11. October 1936.

An example of what building and conserving soil fertility can do for a farm. Before terracing, in 1919, a farm in White County, Tenn., yielded an average of "... only ten bushels of corn to the acre. Now the average production is forty bushels."

ASHE, W. W.

(1799)

TERRACING OF FARM LANDS. N. C. Geol. and Econ. Survey Bull. 17, 38 pp., illus. 1908.

"The subject of terracing of farm lands is one that should be more seriously considered by the farmer of North Carolina, especially those in the

Piedmont section of the State where the farm lands are more subject to erosion . . . Where attempts have been made to use this method and they have not resulted as favorably as expected, it has usually been that sufficient care and attention were not given to the location and construction of the terrace. They have been either too steep, too far apart, or had too much grade on their upper sides. These points in connection with terracing are discussed in detail in Mr. Ashe's report and it is hoped that this short report at this time will be the means of creating a more general use of terracing in the Piedmont section."—Preface.

AYRES, Q. C., and SCOATES, D. (1800)
COST OF TERRACING IN IOWA. Agr. Engin. 16: 317-318. August 1935.

By means of tables and diagrams the author gives a summary and analysis of soil erosion work in Iowa. "The program was carried out on a total of 145 farms in 18 counties . . . Detailed records of the cost of terracing was kept on 72 of these farms and are now available for study."

BAIRD, R. W. (1801)
OPERATION OF POWER MACHINERY ON TERRACED LAND. Agr. Engin. 13: 286-287, illus. November 1932.

At the Tyler Experiment Station, Tex., considerable trouble has been experienced with crops grown on terraced land because of unsuitable equipment. Since on most of this land the rows are parallel to the terraces, this paper is limited to those questions involved in farming parallel to terraces. A two-row tractor planter is described and illustrated.

(1802)
REQUIREMENTS OF A TERRACING MACHINE. Agr. Engin. 16: 3-5. January 1935.

Data on terrace construction and machinery used on the Texas and Oklahoma Agricultural Experiment Stations are given.

(1803)
REQUIREMENTS OF FARM MACHINERY FOR TERRACED LAND; WITH DISCUSSION. Agr. Engin. 16: 97-98. March 1935.

The need of specially designed farm equipment to meet conditions of land already terraced is stressed. A tractor-drawn planter for corn and cotton used at the Tyler, Tex., station, and so far found satisfactory, is described.

(1804)
SOIL EROSION INVESTIGATIONS. Tex. Agr. Expt. Sta. Rept. 46: 141-143. 1933.

Discusses the progress of terracing studies conducted by the United States Bureaus of Agricultural Engineering and Chemistry and Soils at Experiment Substation No. 2, Tyler, Tex.

(1805)
TYPES OF TERRACES. Tex. Agr. Expt. Sta. Rept. 45: 128, 129. 1932.

A summary of a cooperative study on soil erosion by the United States Bureaus of Agricultural Engineering and Chemistry and Soils at Experimental Substation No. 2 at Tyler, Tex. Phases of the subject treated are: Effects of cultivation methods on run-off and erosion from terraced land; erosion and soil-loss studies from watersheds of different characteristics; terrace outlet drops and gully check dams; and operation of machinery on terraced land.

AND HARPER, H. J. (1806)
ENGINEERS SEEK BEST TERRACE PLANS. Okla. Agr. Expt. Sta. Rept. 1926-30: 280-282, illus. 1930.

"The progress results of terracing studies on 13 areas are reported which indicate that terrace ridges can be constructed cheaper with a crawler type of tractor and grader than when a wheel tractor is used . . ."—Expt. Sta. Rec. 64: 778. 1931.

BAKER, F. R.

(1807)

EROSION AND ITS PREVENTION (TERRACING). N. C. Geol. and Econ. Survey Econ. Paper 47: 54-59. 1917.

This article discusses the advantages of terracing to control erosion and presents data on the construction of the broad falling terrace. A cropping system on terraced land is also suggested.

(1808)

THE PREVENTION AND CONTROL OF EROSION IN NORTH CAROLINA, WITH SPECIAL REFERENCE TO TERRACING. N. C. Agr. Expt. Sta. Bull. 236, 27 pp., illus. 1916.

"This bulletin, prepared in cooperation with this Department, states that the area in which soil erosion is especially active in North Carolina is almost wholly within the Piedmont region, but that a considerable amount of the Western Coastal Plain is subject to erosion, the whole area so affected covering over 10,000,000 acres. Methods discussed for the prevention of erosion are (1) proper cultivation, (2) tile drainage, (3) hillside ditches, and (4) terracing. The falling and level terraces are given the most attention . . . Useful accessories, including levels and terrace drags, are also described."—Expt. Sta. Rec. 34: 819, 1916.

BENNETT, H. H.

(1809)

TERRACES CLOSE THE BUNGHOLE. Farm and Ranch 51: 15. July 1, 1932.

Outlines the encroachment of soil erosion. The author states that the evil has been permitted to continue until now 75 percent of all the cultivated land of the Nation is subject in some degree to its depredations.

BENTLEY, M. R.

(1810)

PROMOTING TERRACING WORK IN TEXAS. Agr. Engin. 10: 297-299, illus. September 1929.

"We estimate that nearly three million acres have been terraced in Texas. There are still some eighteen million acres of land in cultivation that should be terraced at once . . . we hope to complete the job in ten years . . . We also need better cooperation between our highway departments and farmers in the control of gullies, that start from the road drainage ditches."

(1811)

TERRACING FARM LANDS IN TEXAS. Tex. Agr. Col. Ext. Bull. 51, 16 pp., illus. 1935.

Among the points discussed with respect to farm terracing are costs, building instructions, instruments used, outlets, cultivation, and maintenance. "Nearly all the cultivated land of Texas is subject to erosion. While gully washing is the most noticeable, doubtless sheet washing is the most damaging. Terracing will check erosion and help to prevent these damaging effects."

(1812)

TERRACING IN OKLAHOMA. Okla. Agr. Col. Ext. Cir. 96, 13 pp., illus. 1919.

Recommends the Mangum terrace as most practical for Oklahoma.

(1813)

TERRACING THE BLACKLAND THIS SUMMER: CROP SO THAT NECESSARY TERRACING MAY BE DONE LITTLE AT A TIME. Farm and Ranch 50: 2, illus. June 20, 1931.

Practical data are given on terracing problems in central Texas.

BLEIJ, G. F. T.

(1814)

TERRACING AND DRAINAGE OF HILL SOILS BY THE "KOTAK" SYSTEM. (Terrasceering en Draineering op Berggronden Volaens het "Kotak" system) Surabaya, Java, Nederland, Indisch Landb. Synd., 9 pp., 1916.

"This is a paper presented at the General Dutch Indian Soil Congress. October 1916. Terracing and drainage to prevent erosion of Java hill soils used for the cultivation of tea and coffee are discussed, and the so-called "Kotak" system of terracing practiced is described . . ."—Expt. Sta. Rec. 36: 723, 1917.

- BLISS, H. B. (1815)
MILLIONS IN SOIL WASHED ANNUALLY FROM HILLSIDES. *Farming* 19: 117. October 1921.
"The destructive work of rains can be prevented in a large measure by terracing and damaged lands made cultivable and profitable." Directions for the construction of terraces are given.
- BROWN, HARRY L. (1816)
TERRACING SAVES GEORGIA LAND. *U. S. Ext. Serv. Rev.* 6: 19-20, illus. March 1935.
The terracing program of Georgia has resulted in a definite trend toward saving old areas once abandoned instead of opening new lands. Types of terraces and proper equipment for both the small and the large farm with estimates of costs per acre are discussed.
- BUIE, T. S. (1817)
COSTS COME DOWN ON 1,937 MILES OF TERRACES. *Soil Conserv.* 2: 151. January 1937.
"The 16-percent decrease in terrace-construction costs was based on a total of 1,937 miles of terraces constructed in the Southeastern Region from July 1 to October 31." This decrease in construction costs is very likely due to increased efficiency.
- BURDETT, H. (1818)
ADVANTAGES OF TERRACING FOR CITRUS PLANTINGS. *Calif. Citrogr.* 5: 179, illus. April 1920.
In order to plant citrus trees on higher levels which seldom freeze and so eliminate the cost of frost fighting, the terracing of hillsides is urged. "It can be confidently asserted that the terraced hillside is a practical success for citrus culture in California." Costs and examples of construction are given.
- THE POSSIBILITIES OF TERRACING. *Calif. Cult.* 54: 612. April 10, 1920. (1819)
Shows that terracing will dispel the erroneous conclusion reached by many observers that because of erosion hillside planting is not practical. Describes terracing in Italy, Spain, and California.
- CALDIERI, S. (1820)
PROTECTION OF INCLINED SOILS AGAINST THE WASHING OF RAIN AND IRRIGATION WATERS. *Rev. Agr. Com., y Trab. [Cuba]* 2: 432-436, 504-508, 565-570, illus. 1919.
"This is a translation by A. Brambilla of an article describing the Italian system of protecting sloping soils against washing and excessive erosion by irrigation and rain water by the use of terraces and ditches."—*Expt. Sta. Rec.* 43: 281. 1920.
- CARN, K. G. (1821)
CONTOUR BANKS ENHANCE LAND VALUES. *Agr. Gaz. N. S. Wales* 45: 599-560. illus. October 1934.
The author cites the case of a farmer in Australia much of whose land was so badly eroded that further cultivation was impossible. Contour banking was carried out on 300 acres and the owner estimates his gain at \$15 per acre. "Experience has shown the best system of cultivation is to plough between and in the same direction as the contour banks and to avoid crossing them with cultivation implements."
- CARNES, A., AND WILSON, J. B. (1822)
TERRACING IN ALABAMA. *Ala. Polytech. Inst. Ext. Cir.* 148, 20 pp., illus. 1934.
"Practical information is presented on useful terracing practices adapted to Alabama soil conditions. It is based on the results of studies conducted at the Alabama Experiment Station . . ."—*Expt. Sta. Rec.* 72: 701. 1935.
- CARNES, EARNEST. (1823)
BUILDING TERRACES TO FIT THE ROTATION PROGRAM. *Soil Conserv.* 1: 11. January 1936.
Gives instructions on terrace construction in South Carolina and enumerates advantages.

- CARPENTER, J. W., and GROSS, E. R. (1824)
 THE TERRACE IN MISSISSIPPI. Miss. Agr. Col. Ext. Bull. 9, 22 pp., illus. 1918.
 "The greatest enemy to fertility in Mississippi is erosion, against which terracing is efficient protection. Make every farm with hill sides a farm with terraces . . . Properly constructed terraces offer no hindrance to the plow." Instructions are given for construction of terraces, terracing implements, including home-made ones. The reclamation of eroded land is discussed.
- CARTER, D. G. (1825)
 POWER TERRACING MACHINES OPERATED COLLECTIVELY. Agr. Leaders' Digest 17: 10, illus. October 1936.
 The cost of terracing in Arkansas approximates \$1 per acre under the collective system of using equipment obtained from the Rural Rehabilitation Corporation.
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- (1826)
 TERRACING FARM LAND. Ark. Agr. Col. Ext. Cir. 182, 11 pp., illus. 1935.
 "Practical information is presented on the terracing of farm land in Arkansas."
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- and HULBURT, W. C. (1827)
 COST OF TERRACING WITH POWER EQUIPMENT. Agr. Engin. 17: 511-512. December 1936.
 "The cost data reported are based upon an analysis of 240 terracing jobs in seven Arkansas counties, where 40-h. p. Diesel tractors operating 10-foot blade terracers are in operation." Operating-cost data are given in tables.
- CATES, J. S. (1828)
 THE MANGUM TERRACE. Country Gent. 84: 5, illus. August 30, 1919.
 The South has developed an ideal terracing system, the author says, which it owes to Priestly Mangum of Wake County, N. C. Under this system any sort of farm machinery can be driven over any part of a field. To prevent soil erosion and gulying the author advocates the more efficient use of machinery. Simple methods for making Mangum terraces are described in detail.
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- (1829)
 THE MANGUM TERRACE IN ITS RELATION TO EFFICIENT FARM MANAGEMENT. U. S. Bur. Plant Indus. Cir. 94, 11 pp., illus. 1912.
 "The advantages and construction of the Mangum terrace worked out by P. H. Mangum of Wake Forest, N. C., are briefly described. . . . The advantages of this system are stated to be its adaptation to all types of soil, especially to moderately rolling lands, the possibility of using extensive cultivation machinery and cultivating across the terrace, the saving of labor and land, and the ease of preserving the terrace when once constructed."—Expt. Sta. Rec. 27: 720. 1912.
- CHAMBERS, T. B. (1830)
 IS TERRACING ENOUGH? The Land, Today and Tomorrow 1: 1-5, 24-26, illus. December 1934.
 The author discusses the utility of various types of terraces and shows that terracing must in many places be coordinated with other erosion-control practices to be effective.
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- (1831)
 TERRACE MAINTENANCE. Farmer-Stockman 50: 33. January 15, 1937.
 Terraces will remain effective for years, with careful plowing and regular repair work after rains.
- CHARLES, F. E. (1832)
 STONE TERRACES OF KENTUCKY DEFY EROSION FOR CENTURY. Soil Conserv. 2: 64-65, 83, illus. October 1936.
 A detailed description of a hill farm in Kentucky, once the site of a Benedictine monastery. Stone terraces built before the Civil War "have been nearly 100 percent efficient in controlling erosion . . . No visible signs of active erosion are apparent on the terraced area, whereas nearby unterraced land has been completely destroyed by sheet and gully erosion."

The author points out that much may be learned from the pioneer work on this old farm. "Modern soil conservation engineers might well contemplate the effectiveness of the riprap terrace outlets. Water catapults harmlessly from one bench to another because the outlets are paved with stone."

- CHARLES, TUDOR. (1833)
THE BIGGEST COMPLAINT ABOUT TERRACES. *Kans. Farmer* 74: 3, 23, illus. June 5, 1937.

Unsatisfactory outlets are cause of many complaints. Suggestions are given for handling run-off from terraced fields without damage.

- CLARK, M. W. (1834)
TERRACE OUTLETS FOR MISSOURI. *Mo. Col. Agr. Ext. Cir.* 355, 27 pp., illus. 1936.

Design and construction of mechanical structures are discussed, together with advice for repairing old outlets.

- CLAYTON, B. S. (1835)
TO PREVENT EROSION IS FUNDAMENTAL CONSIDERATION IN SOIL CONSERVATION. *Farming* 21: 116. July 1923.

The control of water in order to prevent soil erosion is stressed. Terracing with broad-base sloping terraces is the most satisfactory means of preventing erosion on hill farms. Directions are given for the construction and spacing of these terraces.

- CLAYTON, E. S. (1836)
CONTROL OF SOIL EROSION ON WHEAT LANDS. *Agr. Gaz. N. S. Wales* 42: 825-832, illus. November 1931.

The causes of soil washing and gullyng are discussed, and the damage done by sheet washing in the wheat country in New South Wales is described. The broad-base contour drain, or Mangum terrace, is described and illustrated, and experience with it at the Cowra Experiment Farm given. The author concludes by showing the ease with which terraced land is farmed and repaired when necessary.

- CLEGHORNE, W. S. H. (1837)
RECLAMATION OF THE VELD BY MEANS OF INTERRUPTED CONTOUR BANKS. *Farming in So. Africa* 8: 145-148, illus. April 1933.

The work here described is part of that done at the Grootfontein School of Agriculture under the aegis of the soil erosion committee. See also "Veld Reclamation at Grootfontein," *South African Jour. Sci.* 30: 108-111. 1933.

- CLEMSON AGRICULTURAL COLLEGE. (1838)
ORCHARD TERRACING. *Clemson Agr. Col., S. C., Ext. Div. Bull.* 97, 15 pp., illus. 1936.

In this bulletin studies and practical recommendations on terracing lands to be planted to new orchards as well as building proper terraces in old orchards are presented.

- CLYDE, A. W. (1839)
TERRACING TO REDUCE EROSION. *Iowa Agr. Col. Ext. Bull.* 172, 8 pp., illus. 1931.

Terraces and their construction are discussed. A general plan for laying out terraces is given, and the tools now on the market for building them are described and illustrated. Methods of cultivation and terrace maintenance are considered.

- COLLINS, E. V., AND OTHERS. (1840)
NEW TYPE OF TERRACING MACHINE. *Agr. Engin.* 16: 6-7, illus. January 1935.

The plan is given of a terracing machine developed at the Iowa Agricultural Experiment Station. "In addition to building terraces, the machine is well adapted to filling small gullies, and to the construction of open ditches and terrace-outlet channels."

- COOK, O. F. (1841)
STAIRCASE FARMS OF THE ANCIENTS. Natl. Geogr. Mag. 29: 474-534, illus. May 1916.
"The system of agriculture developed by the ancient Peruvians enabled them to support large populations in places where modern farmers would be helpless." The marvelous terrace agriculture; the artificial construction of the soil on which the crops were grown, not only on terraces but in large areas of reclaimed land in the bottoms of the valleys, are described. "Thousands of the ancient terraces have stood through the centuries, and the soil that the ancient people laid down is still in place." The structure of these terraces is discussed and explained as well as the irrigation methods used by the people of ancient Peru.
- COPELAND, J. T. (1842)
LATE DEVELOPMENTS IN PREVENTING EROSION. Agr. Engin. 11: 94, illus. March 1930.
"Terrace location by Copeland's National Principle Terracing System is determined by finding the difference in elevation of adjacent erosion planes and establishing that difference as the measure for locating terrace elevation for the area . . . In use the natural principle terracing system has established the fundamentals of terrace success and has simplified the whole field practice until it becomes a matter of following a routine of simple technique which is readily effective with both farmers and boys."
- (1843)
STANDARDS OF TERRACING. Agr. Engin. 3: 156. September 1922.
"The agricultural terrace is designed for the economical prevention of erosion and for reclaiming lands which have become unprofitable through exposure to the natural and free course of water."
- (1844)
TERRACING IN MISSISSIPPI. Miss. Agr. Col. Ext. Bull. 34, 19 pp., illus. 1926.
Presents practical information on terracing under Mississippi conditions for preventing soil erosion.
- (1845)
TERRACING POINTERS. Assoc. South. Agr. Workers Proc. Ann. Conv. 31: 272-273. February 5-7, 1930.
"The terracing pointers presented herein were derived from the experiences of the writer in solving soil erosion-control problems with the farmers and county agricultural agents of Mississippi, since 1919 . . ."
- DARROW, W. H. (1846)
THE COUNTY AGENT: TERRACING FOOL. Farm and Ranch 52: 3. January 1, 1933.
Describes the terracing of farm lands in Texas under the supervision of the County agent. The article gives some data on the increased value of terraced land. Accompanied by a table showing the number of acres terraced each year in Texas from 1916 to 1931.
- DICKSON, R. E. (1847)
TERRACES TO CONSERVE SURFACE RUN-OFF. Agr. Engin. 14: 50, illus. February 1933.
Experiments at the Spur, Tex., station show that run-off could be materially reduced through the use of "level terraces" as opposed to those having slopes. Figures show the increased yield of cotton from areas with level terraces.
- DOWNING, J. M. (1848)
ASPHALT TERRACE OUTLET. The Land Today and Tomorrow 2: 22-24, illus. April 1935.
This article presents data on the construction and approximate costs of asphalt terrace outlets.
- DRIFTMIER, R. H. (1849)
PROTECTING TERRACE OUTLETS. Capper's Farmer 45: 32. April 1934.
"Fifteen thousand feet of terraces in one year is quite an accomplishment on a 200-acre farm." On a farm in Coffey County, Kans., experi-

ments in terrace-outlet building were made to get comparative costs. These are described.

- DU TOIT, E. (1850)
CONTROLLING SOIL EROSION ON THE PRINSHOF FARM, PRETORIA; CONTOUR BANKS AND PASTURE GRASSES. *Farming in So. Africa* 9: 259-260, illus. July 1934.

A system of interrupted contour banks for the control of soil erosion is described, with an airview photograph of these contour banks to illustrate the work done. "The author is convinced of the effectiveness and practicability of the system if reasonably applied and correctly constructed."

- DUGGER, J. F. (1851)
LAYING OFF AND BUILDING TERRACES. *Prog. Farmer (Eastern Ed.)* 35: 484-485. February 28, 1920.

The author gives general rules for the construction and laying off of terraces, with special emphasis on broad-side terraces.

- DULEY, F. L. (1852)
A NEW TYPE OF BROAD-BASE TERRACE. *Science* 79: 301-302, illus. March 30, 1934.

The writer describes tests made at the Kansas Agricultural Experiment Station at Manhattan on small terraced and unterraced plats for soil and water conservation.

- AND SHEDD, C. K. (1853)
TERRACING FARM LANDS IN KANSAS. *Kans. Agr. Col. Ext. Bull.* 58, 13 pp., illus. 1929.

"The loss of soil by erosion is serious in Kansas because a large proportion of rainfall comes in dashing rains." The authors present effective methods of lessening soil erosion: (1) Planning a cropping system so that the land will be covered as much of the time as is practical; (2) stopping new gullies with straw, brush, or other types of soil-saving dams; (3) contour plowing and planting; and (4) terracing.

- EARLE, E. P. (1854)
PARABLE OF THE TERRACES. *Prog. Farmer (Eastern Ed.)* 34: 421. March 8, 1919.

"A little time spent in the saving of land is worth many dollars paid for more land." The progressive deterioration of a farm from soil erosion, and its subsequent reclamation through newer agricultural methods and the use of terraces, is related.

- ELLISON, W. D. (1855)
MEMORANDUM TO E. C. W. TECHNICIANS ON THE DESIGN AND CONTROL OF BROAD SHALLOW TERRACE OUTLET DITCHES. U. S. Soil Conservation Service SCS-BP-9, 5 pp., illus. November 1935. [Mimeographed.]

"The purpose of this memorandum is to make a few suggestions that may be helpful in designing terrace outlet ditches and developing the vegetative control phase of the work in E. C. W. erosion camps . . ."

- (1856)
TERRACE OUTLETS. *Agr. Engin.* 16: 298-300, illus. August 1935.

"Our methods of controlling erosion in terrace outlets are of two types: (1) Control with a low-growing perennial grass having an extensive root system, and which provides a permanent vegetal cover; and (2) control with mechanical works." Outlet ditches and check dams are shown in diagrams.

- EMERY, F. E. (1857)
HILLSIDE TERRACES OR DITCHES. *N. C. Agr. Expt. Sta. Bull.* 121, pp. 319-326, illus. 1895.

Presents practical data on the construction of Mangum terraces. Instructions in laying off and forming the terraces are given and a detailed description of the construction of a leveling instrument is included.

- ESCOBAR R. (1858)
LA RETENCION DE TIERRAS Y EL DOMINIO DE LAS AVENIDAS. *Estac. Agr. Expt. de Ciudad Juárez, Chihuahua [Mexico] Bol.* 42, 34 pp. 1913.

Whether rain water shall be absorbed by the soil or run off the surface of the land is dependent on the intensity of the rainfall, the slope of the

land and its type, the nature of the surface, the class of vegetables, etc. The problem discussed is that of conserving all the water possible in arid regions. In a study of floods and flood control, the control of watersheds, and the prevention and reclamation of gullies, various methods of holding and using rainfall on slopes are discussed in detail and illustrated. Among them are terracing and contour furrowing. The Testaferrata system of hillside cultivation and irrigation, based on the one established by Leonardo da Vinci, is described at length. The denudation of forest lands is deplored.

EZELL, P. B. (1859)
CONTRACT TERRACING GAINS IN THE SOUTH. Agr. Leaders' Digest 18: 9. January 1937.

The county farm agent of Newberry County, S. C., describes work done for 94 farmers.

FARRINGTON, F. N. (1860)
TALLAPOOSA COUNTY'S TERRACING PROGRAM. Agr. Engin. 16: 313-316, illus. August 1935.

"Saving the soil of Tallapoosa County [Alabama] is the key thought travelling the channels of the minds of every citizen in the county. This has been brought about by very carefully planning a country-wide educational program on soil conservation." This program is outlined in detail. The author states that 126 farmers have terraced 6,500 acres of land at an average cost of \$1.69 an acre.

FELSINGER, E. O. (1861)
A FURTHER MEMORANDUM ON THE DRAINING OF HILLY LANDS WITH A VIEW TO REDUCING SOIL EROSION. Trop. Agr. [Ceylon] 74: 68-70, illus. February 1930.

"Methods of draining and terracing hill lands, planted to rubber, to prevent erosion are described and diagrammatically illustrated."—Expt. Sta. Rec. 64: 777, 1931.

FINNELL, H. H. (1862)
THE MOISTURE-SAVING EFFICIENCY OF LEVEL TERRACES UNDER SEMI-ARID CONDITIONS. Jour. Amer. Soc. Agron. 22(6): 522-529. 1930.

"The results of investigations conducted at the Oklahoma Panhandle Experiment Station are reported. The use of terracing to utilize 2.33 in. of run-off water annually, which when held on terraces has a penetrating efficiency of 34.5 percent, increased the annual supply of soil water from 3.58 to 4.38 in."—Expt. Sta. Rec. 63: 878. 1930.

RESULTS OF LEVEL TERRACING ON HEAVY SILT LOAM SOIL. Okla. Panhandle Agr. Expt. Sta. Bull. 53, 12 pp. 1934. (1863)

"This bulletin embodies a summary of general observations previously reported (E. S. R. 66: 181) and a preliminary report on the results of different terracing spaces observed over the period 1930-33 . . ."—Expt. Sta. Rec. 71: 397. 1934.

TERRACING EXPERIMENTS. Okla. Panhandle Agr. Expt. Sta. Bull. 15: 11-15, illus. 1930. (1864)

"Experiments are briefly reported which showed that when the initial moisture supply is great and the seasonal rainfall normal or better, large yields may be expected on both untterraced and terraced lands and the increase obtained from terrace-saved water is relatively smaller. Further experiments showed that there is apparently some wasteful duplication of effort where terracing and fallowing are practiced simultaneously . . ."—Expt. Sta. Rec. 63: 276. 1930.

TERRACING EXPERIMENTS, 1930-31. Okla. Panhandle Agr. Expt. Sta. Bull. 31: 3-9. 1931. (1865)

"This is the third progress report of these experiments (E. S. R., 61, p. 77; 63, pp. 276, 878). In general, it has been shown that terraces must be built close enough together to prevent excessive accumulations of water

at any one place in the field during heavy rains. Impounding more water in a particular area than the crop occupying that space can effectively utilize results in waste which markedly decreases the efficiency of the terrace system. In run-off studies it was found that the percentage was largely affected by the character of cover or crop on the land, the least run-off being observed where grass was growing . . ."—Expt. Sta. Rec. 66: 181. 1932.

FINNELL, H. H. (1866)

TERRACING FOR MOISTURE CONSERVATION. Okla. Panhandle Agr. Expt. Sta. Bull. 2: 13-16, illus. 1929.

"The results of experiments at Goodwell, Okla. on the use of terracing for soil moisture conservation are briefly presented and discussed . . ."—Expt. Sta. Rec. 61: 77. 1929.

FLETCHER, L. J. (1867)

VARIABLE FIELD REQUIREMENTS OF TERRACING EQUIPMENT. Agr. Engin. 16: 5, January 1935.

"Complete standardization in size or type of terracers is not only impossible but undesirable. Field requirements vary too much to allow such a procedure." The various field conditions found and differing types of outlets are discussed briefly.

FOSTER, R. L. (1868)

SAVING THE HILLSIDE; RECLAIMING THE SWAMP. Prog. Farmer (Miss. Valley Ed.) 35: 1912, 1914, illus. December 4, 1920.

Outline of drainage laws and erosion control in Arkansas. The author finds that 2 million acres have been drained in recent years by the establishment of local drainage districts, and that county agents have laid out terraces for over 30,000 acres. Advises enlisting the services of an engineer or expert in locating terrace lines.

FRYE, C. A., AND WOOD, I. D. (1869)

MEMORANDUM FOR E. C. W. CAMPS IN NEBRASKA RELATIVE TO TERRACES AND OTHER EROSION CONTROL STRUCTURES. U. S. Bur. Agr. Engin. 14 pp., illus. March 1935. [Mimeographed.]

Discusses cooperative work in erosion control, designing and laying out of terraces, construction of terraces, protection of outlets, the use of large structures in terrace projects, and terracing of orchard lands.

GANTZ, H. L. (1870)

SAVING THE "VEGETABLE CAP": THE SOUTHWEST IS DEVELOPING A CONSCIOUSNESS OF SOIL STEWARDSHIP. Farm and Ranch 50: 1, 3, illus. June 27, 1931.

"Terracing in the Southwest is sounding the death knell of erosion . . . It is one of the devices of mankind to enforce ways of dealing with the 'vegetable cap' of the earth in order to preserve the source of life." The author discusses soil erosion losses in Texas and Oklahoma and shows that the increase in terracing in both States has proved the most effective means of control.

GLASS, J. S., AND EIER, H. F. (1871)

TERRACING TO CONTROL EROSION—A PROFITABLE FARM PRACTICE. Kans. Agr. Col. Ext. Bull. 70 (revised) 41 pp., illus. July 1932.

"Loss of soil fertility, failure to adhere to a soil-management schedule, and mismanagement of rolling farm lands lead rapidly to an erosion-control problem . . . The use of the broadbase terrace in the control of erosion on these areas will be the basis for the present discussion . . . Terracing prevents the accumulation of miniature streams from flowing down the slopes and handles as individual problems the drainage from small watersheds." The equipment necessary and the construction of terraces are described and illustrated.

GREENE, S. W. (1872)

LEVEL TERRACING FOR PASTURE LANDS. Amer. Soc. Anim. Prod. Proc. 1932: 156-159, illus. January 1932.

"Closely spaced terraces built on contour lines of pastures prevent run-off and increase the yield of forage by conserving the rainfall" was the conclusion reached through experiments at the McNeill Experiment Station, Miss.

- GREGORY, W. H. (1873)
COUNTY LAND TERRACING PROGRAM. Agr. Engin. 15: 22. January 1934.
A soil-improvement program in Jackson County, Ala., is described. "In this time of economic stress our terracing programs have been invaluable."
- GROSS, E. R. (1874)
TERRACING TO PREVENT EROSION. N. J. Agr. 16: 6. 1934.
"A brief description of the practice of terracing is given."—Expt. Sta. Rec. 71: 105. 1934.
- HALL, F. W. (1875)
COST OF TERRACES AND SILT PITS ON THE KAMPALA PLANTATION. Uganda Dept. Agr. Ann. Rept. 1929: 52-54. 1930.
Presents estimates of costs of constructing full terraces, platform terraces, deep and shallow catch pits, and full terraces with buttresses every 15 feet.
- HAMILTON, C. L. (1876)
SOME ENGINEERING ASPECTS OF TERRACE OUTLETS AND WATERWAYS. Agr. Engin. 17: 522-525, illus. December 1936.
The relatively new field of erosion-control work involves problems dealing with the sciences of hydraulics, hydrology, construction, soils, and other subjects related to soil and water conservation. The development of proper design and construction data with regard to outlets and waterways are described. The results of intensive studies at Spartanburg, S. C., and in Texas are presented.
- (1877)
TERRACE PROJECT PLANNING. Agr. Engin. 18: 315-317, illus. July 1937.
"Heretofore, terrace planning has consisted primarily of the details involved in planning a terrace system preparatory to the construction work . . . The other aspect which has more recently been recognized deals with terrace project planning activities preparatory to the actual field planning or staking of a terrace and outlet system." The author describes in detail the newer planning methods.
- HENRY, JEROME J. (1878)
BOYS DEMONSTRATE EROSION CONTROL METHODS. South. Agr. 67: 15, illus. February 1937.
Two boys discover the usefulness of terracing at a Soil Conservation Service demonstration project in South Carolina and apply their lesson advantageously on their parents' farm.
- (1879)
THE NICHOLS TERRACE: AN IMPROVED CHANNEL-TYPE TERRACE FOR THE SOUTH-EAST. U. S. Dept. Agr. Farmers' Bull. 1790, 12 pp., illus. 1937.
"Since colonial days southeastern farmers have built various types of terraces and hillside ditches to conserve the soil on cultivated fields. Some of their efforts were temporarily successful. Often the structures did more harm than good. Years of experimentation by interested agricultural agencies has resulted in the gradual improvement of terraces. In the Southeast the Nichols type is widely accepted as most effective. Continued improvement of the Nichols terrace has resulted in the development of terracing systems that seem ideal. This terrace, described herein, represents a major contribution to agriculture."
- HICKEY, FRANK. (1880)
TERRACES STOP BLOWING, BOOST YIELD. Farmer-Stockman 245, illus. April 15, 1937.
The author gives an account of the advantages gained from terracing his farm with the home-made McPheters terracer, the cost of material being only \$6.
- HILL, G. O. (1881)
PREVENTING SOIL EROSION. Purdue Agr. 24: 206, illus. June 1930.
The author recommends terracing as a major erosion preventative in Indiana. The different types of terraces are considered and their utility under varying conditions discussed.

- HILL, H. O. (1882)
TERRACE OUTLET CONTROL. Agr. Engin. 16: 403-407, illus. October 1935.
Erosion control at the terrace outlet. "In order to investigate the holding capacities of different vegetative coverings under various velocities, ditches have been designed which will give a velocity of 1 to 15 feet per second. All vegetative ditches are inspected after each run-off to determine the maximum depth of water, apparent erosion, condition of channel, condition of vegetation, and other important factors. From these data the actual maximum velocity that each ditch section attained is computed after every inspection. The data are then compiled and a frequency curve drawn showing the relation between silting and erosion at different velocities as developed in the ditches."
- HILLMAN, V. R. (1883)
A METHOD OF MEASURING ACRES PER MILE OF TERRACE AND TOTAL ACRES BENEFITED. Agr. Engin. 17: 395-408. September 1936.
- HODGKIN, CARLYLE. (1884)
FARMERS BUILD TERRACES. 18 MEN EACH INVEST \$100—OPERATING COST AVERAGES \$30 PER MILE—PROPER EQUIPMENT EMPHASIZED. Nebr. Farmer 78: 7, 21, 28, illus. June 6, 1936.
Description is given of terracing operations of farmers' cooperative soil-improvement association in Gage County, Nebr., including organization, cost, equipment used, and type of terraces used for moisture conservation and erosion control.
- HOLLAND, T. H. (1885)
CONTOUR TERRACING ON THE EXPERIMENT STATION, PERADENIYA. Trop. Agr. [Ceylon] 69: 151-154, illus. September 1927.
Contour terracing is described in detail. Conclusions as to the checking of soil erosion and retention of rainwater on slopes of various angles are given.
- (1886)
A NOTE ON CONTOUR TERRACING FOR RUBBER. Trop. Agr. [Ceylon] 72: 3-10, illus. January 1929.
A detailed description and discussion of "the construction of plain earth contour platform sloped back into the hill." The following points must be decided before starting to terrace a clearing: (1) Whether holing is to be done before terracing or vice versa; (2) the distance apart of the terraces and the spacing between plants in the terrace; (3) the width and the slope of the terrace. Transverse bunds (earth banks), overflow of accumulated water, and cost of construction are also considered.
- HOLMAN, A. T. (1887)
PROBLEMS INVOLVED IN DEVELOPING TERRACING MACHINERY. Agr. Engin. 12: 45. February 1931.
The author bases his comments on experiments made in North Carolina.
- (1888)
TERRACE CROSS SECTIONS AS INFLUENCED BY SOIL, CROPS, LAND SLOPES, AND FARM MACHINERY. Agr. Engin. 18: 5-8, illus. January 1937.
This paper was presented before the Soil and Water Conservation Division at the winter meeting of the American Society of Agricultural Engineers at Chicago, December 1936, and outlines some of the factors that seem important in terrace design and points out some inevitable variations of terraces in size, shape, and capacity.
- (1889)
TERRACING FARM LANDS. N. C. Agr. Col. Ext. Cir. 173, 19 pp., illus. 1935.
The author discusses miscellaneous terracing factors and gives 10 rules for successful terracing. "The Mangum terrace is the best known means of controlling erosion on North Carolina farms. Gullyng can be controlled by using soil-saving dams."
- HUGHES, O. E. (1890)
TERRACING FARM LAND IN GEORGIA. Ga. Agr. Col. Ext. Bull. 394, 24 pp., illus. 1935.
The order of procedure in terracing a field is divided into four parts: Preliminary work; laying off terraces; construction; and maintenance.

The author discusses these proceedings with the aid of diagrams, tables, and photographs of actual construction work.

ILLINOIS AGRICULTURAL EXPERIMENT STATION. (1891)

CONTROL OF COSTLY SOIL EROSION IS SOUGHT. Ill. Agr. Expt. Sta. Ann. Rept. 37: 174. 1924.

"Experiments by F. P. Hanson on the control of soil erosion have shown that terraces give satisfactory service when properly built and used."—Expt. Sta. Rec. 54: 381. 1926.

(1892)

WELL MAINTAINED TERRACES STOP SOIL EROSION LOSSES. Ill. Agr. Expt. Sta. Rept. 1933: 205-206. 1933.

Briefly describes methods of terracing in Illinois as suggested from a study by the Bureau of Agricultural Engineering.

INDIANA AGRICULTURAL EXPERIMENT STATION. (1893)

SOIL EROSION PREVENTION. Ind. Agr. Expt. Sta. Rept. 1930: 10-11. 1930.

A brief discussion of terracing on the Paoli field.

JACKSON, H. R. (1894)

TERRACERS BOTH LARGE AND SMALL. Agr. Leaders' Digest 18: 9. January 1937.

Henderson County, Ky., has a record in terracing and the use of marl.

JOHNSON, D. C. (1895)

TERRACE OUTLETS. Soil Conserv. Digest (Calif.-Nev.), 3: 9-11. February 1937.

"The terrace outlet . . . is entitled to be classified as one of the most important structures with which we have to deal." The important features are discussed, and conditions for which the terrace outlet structures are designed are listed.

JOHNSON, G. I. (1896)

TERRACE MAINTENANCE. Ga. Agr. Col. Ext. Cir. 260, 4 pp., illus. 1935.

Figures are used to show results of improper terrace maintenance, and instructions are given for spacing terrace rows, correct plowing, and outlet protection.

JONES, LEWIS A. (1897)

DRAINAGE AND TERRACING IN ALABAMA SINCE PASSAGE OF DRAINAGE LAW. PROGRESS BEING MADE. Prog. Farmer (Ga.-Ala. Ed.) 35: 12, illus. December 1920.

A description of experiments on drainage in the vicinity of the Alabama River. The author discusses the value of Mangum terraces on the hill lands of Alabama and illustrates their nature and use.

(1898)

SAVING FARM LAND FROM EROSION, WITH COUNTY ROAD MACHINERY. Amer. City 45: 13. September 1931.

"The Legislatures of Texas and Oklahoma recently passed laws authorizing county officials to permit landowners to use county road machinery such as tractors and graders, to construct terraces on their properties, when the machines are not in use on road work. In Texas, the farmer pays a reasonable rental for the machinery, while in Oklahoma he is required to pay only its operating cost." Approximate costs are given for Texas.

(1899)

TERRACING TO CONTROL EROSION IF WELL DONE, IS PAYING INVESTMENT. U. S. Dept. Agr. Yearbook 1928: 575-577, illus. 1929.

Compares the narrow-base terrace with the broad-base and recommends the latter. Drainage outlets are also discussed.

KNOX, J. S. (1900)

HOW I BUILD TERRACES AND SAVE THE LAND. Prog. Farmer (Miss. Valley Ed.) 40: 1187, illus. December 26, 1925.

Describes the laying out and construction of broad-base terraces. Factors considered are: width of terraces; amount of fall; implements necessary for construction; nature of land to be terraced; topography, etc.; and

cropping practices to aid terracing. States that terraces have been constructed for as low as 65 cents an acre when tractors and road machines were used.

- LANDON, I. K. (1901)
SODDED TERRACE OUTLETS. *The Land, Today and Tomorrow* 1: 1-3, illus. December 1934.

Studies at the Coon Creek project in Wisconsin showing how flat-bottomed waterways prove that terrace outlets may be economical and still prove efficient.

- LATHAM, A. M. (1902)
ONE TERRACED FARM AN OBJECT LESSON. *Prog. Farmer* (Eastern Ed.) 32: 1091. October 20, 1917.

The author relates his experiences in terracing on a hillside farm in Texas.

- LEAVITT, E. T. (1903)
KEEP THE SOIL WHERE IT BELONGS: MODERN METHODS OF TERRACING WILL DO THIS. *Wis. Agr. and Farmer* 58: 3, 17, illus. November 22, 1930.

Recommends the use of the Mangum or broad-base terrace in erosion control. Average costs per acre are given.

- LEBRON, L. C., AND M. L. NICHOLS. (1904)
TERRACING IN ALABAMA. *Ala. Polytech. Inst. Ext. Cir.* 94, 11 pp., illus. 1926.

"Practical information on terracing for the prevention of soil erosion under Alabama conditions is presented."—*Expt. Sta. Rec.* 56: 316. 1927.

- LEHMANN, E. W. (1905)
SOIL EROSION CONTROL IN ILLINOIS. *Agr. Engin.* 13: 126-127, illus. May 1932.

"The problem of soil erosion is a problem of surface drainage, the solution of which is dependent largely on the conservation and control of flow of surface water . . . Run-off and erosion are also dependent on topography, soil, and cultural practices on the land." The value of terracing to prevent soil washing, as proved in an early experiment by the Illinois Agricultural Experiment Station, is discussed, and the advantages of Mangum or broad-base terraces on sloping ground are illustrated.

- _____. (1906)
TERRACING TO PREVENT EROSION. *Agr. Engin.* 2: 86-88. April 1921.

The author emphasizes certain practices for erosion control in the South, with particular reference to the soil problems of Missouri. Some types of terraces used in Europe are described as most applicable to various land slopes in the United States.

- _____. (1907)
TERRACING TO PREVENT EROSION. *Amer. Soc. Agr. Engin. Trans.* (1917-18) 11: 78-87, illus. 1918. [Also in *Power Farming* 27: 50-53. May 1918.]

The author discusses forms of erosion, farm practices that cause erosion, and methods of preventing erosion. Terracing is the most important of these methods of prevention. Various types of terrace most applicable to land of various slopes with the manner of construction are described. Cost and maintenance of terraces are discussed.

- _____. (1908)
TO KEEP SOIL AT HOME. *Successful Farming* 29: 7, 38-39, illus. August 1931.

The author discusses briefly the value of the Mangum terrace in erosion control. Local conditions in Illinois are considered, the experiences of farmers in Wabash, Richland, Saline, and Christian Counties being described.

- _____. AND DULEY, F. L. (1909)
THE MANGUM TERRACE. *Mo. Agr. Expt. Sta. Cir.* 98, 10 pp., illus. 1920.

"On rolling lands erosion is the soil's worst enemy. The Mangum Terrace is a means of checking this loss of soil caused by washing during heavy rains. It is a simple device for holding the soil of the farm in place,

thereby maintaining the fertility and making it possible to improve the soil by proper cropping methods." A plan of terraces on fields adapted to them with proper outlets is described. A simple home-made level is illustrated, and directions for the construction and maintenance of the terraces are given.

LEHMANN, E. H., AND HANSON, F. P. (1910)
SAVING SOIL BY USE OF MANGUM TERRACES. Ill. Agr. Expt. Sta. Cir. 290, 19 pp., illus. 1924.

"Practical information on the planning and construction of Mangum terraces for the prevention of soil erosion in Illinois is presented."—Expt. Sta. Rec. 52: 22. 1925.

—AND HAY, R. C. (1911)
TERRACES TO SAVE THE SOIL. Ill. Agr. Expt. Sta. Cir. 459, 31 pp., illus. 1936.

Some general facts about erosion and terracing. Planning the terrace system and terrace outlets are among the subjects covered. "Maintenance of a fertile, productive soil is the first requirement of a prosperous and permanent agriculture." Sheet and gully erosion have proved controllable through terracing and vegetative cover. Instructions on how to build terraces are diagrammatically presented.

LEMERT, H. W., AND ZINGG, A. W. (1912)
METHOD FOR FINDING TERRACE CROSS SECTIONS. Agr. Engin. 18: 296, 300. July 1937.

"Heretofore there has been no practical method whereby one terrace could be easily and quickly compared with another." This article describes a quick, practical method for measuring terrace ridge and channel cross sections with a degree of accuracy sufficient for all practical field purposes.

LEPLAE, E. (1913)
THE CONSTRUCTION OF TERRACES. Rev. Gén. Agron. 12: 435-442. September 1903.

A description of the types of implements used in the construction of terraces are given, with costs.

LIVINGSTON, L. F. (1914)
METHODS OF BLASTING LATERAL-ROOTED STUMPS IN TERRACING WORK TO PREVENT SOIL EROSION. Agr. News Letter 3: 20-22. July 1935.

"This article, dealing with the removal of lateral-rooted stumps, is for the information of those concerned with the work of terracing fields in Northern and Western States."

LONGSDORF, L. L. (1915)
GOOD OUTLETS GO WITH GOOD FARM TERRACES. Agr. Leaders' Digest 17: 11. March 1936.

Three types of terrace outlets are described—pasture sod, flat-bottom draw, and turn-row channel, at the Kansas Soil Erosion Service project west of Mankato.

LYLE, S. P. (1916)
EIGHTEEN YEARS OF SOIL EROSION CONTROL. U. S. Ext. Serv. Rev. 4: 120-122, illus. December 1933.

The value of terracing in preventing soil erosion is pointed out.

— (1917)
TERRACING IN A LAND USE PROGRAM. U. S. Bur. Agr. Engin. 6 pp. 1934. [Mimeographed.]

"In this brief mimeographed contribution, the importance of terracing in connection with the development of a sound land-use program is presented."—Expt. Sta. Rec. 72: 701. 1935.

— (1918)
TERRACING—THE FIRST STEP IN EROSION CONTROL. U. S. Bur. Agr. Engin. and Ext. Serv. 10 pp. 1933. [Mimeographed.]

Address before the Illinois Farm Advisors' Summer Conference, June 13, 1933. Discusses the advantages and disadvantages of different types of terraces and gives estimates on the value of terracing per acre. Machinery on terraced land is also given some attention.

- LYNDE, H. M. (1919)
THE MANGUM OR BROAD-GRADED TERRACE. Prog. Farmer (Eastern Ed.) 32: 1090, 1095. October 20, 1917.
The author gives a detailed description of terrace building with directions as to width and height, grade, distance apart, length, and outlets. He asserts that no better or cheaper means of control of soil erosion has ever been devised.
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- TERRACING: TEN RULES TO OBSERVE. Prog. Farmer (Eastern Ed.) 35: 457. (1920)
February 21, 1920.
The construction of Mangum terraces, outlets, location, width and height, crossing gullies, is specifically described. Tables for distance between terraces and fall and length are given. The writer concludes: "A poorly constructed terrace does more harm than no terrace at all."
- MCADAMS, A. J. (1921)
THE MISSOURI HOMEMADE TERRACING FRAME. Country Gent. 93: 51, illus. October 1928.
This frame is simple to operate and is sufficiently accurate for the majority of terracing locations. The construction is described and illustrated.
- MCALISTER, J. T. (1922)
MAINTAINING THE BROAD BASE TERRACE. S. C. Agr. Engin. Inform. Cir. 4, 8 pp., illus. 1931. [Mimeographed.]
Practical instructions on the location and laying out of terraces are given. The conversion of narrow-ridge terraces into broad-base terraces is treated, and a discussion given on terrace cultivation.
- MCPHETERS, W. H. (1923)
BAFFLES FOR TERRACE OUTLET CONTROL. Okla. Agr. Col. Ext. Cir. 328, 14 pp., illus. 1935.
A structure placed in the terrace-outlet ditch to protect the ditch from being washed out into a gorge is described. The use and importance of the baffle are discussed as well as the proper location.
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- HOW I WOULD TERRACE MY FARM. Farmer-Stockman 50: 3, illus. February 15, 1937. (1924)
Describes the construction of terraces and contour furrows and the implements necessary for this work.
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- HOW TO MAKE AND USE THE MCPHETERS TERRACER. Okla. Agr. Col. Ext. Cir., 340, 15 pp., illus. 1937. (1925)
Discusses new terracer versus old type V-drag, size of terracer, tools needed, bills of material, making the terracer, and how to build terraces.
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- ROADSIDE AND HILLSIDE PROTECTION AGAINST SOIL EROSION. Agr. Engin. 10: 282-284, illus. Sept. 1929. (1926)
Methods for taking care of terrace water are discussed. The author is seeking the best and cheapest method of protecting the ditches that are to carry the water from the terrace. A detailed description of baffles and their construction is given.
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- MARTIN, G. E. (1927)
PROMOTING TERRACING IN OKLAHOMA. Agr. Engin. 10: 299. September 1929.
"The chief promotional agency of the Oklahoma extension service is the permanent demonstration . . . Upon the quality of the cooperation depends the final success of the demonstration . . . it is still one of the big problems of erosion control." Statistics on numbers of people trained in terracing work, and a plan for promoting terracing in Payne County, Okla., are presented.
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- TERRACING IN OKLAHOMA. Okla. Agr. Col. Ext. Cir. 218, 23 pp., illus. 1928. (1928)
"This circular points out the benefits of terracing to landowners and operators, and describes a method of terracing whereby it is thought these benefits may be secured."—Expt. Sta. Rec. 59: 478. 1928.

- MARTIN, G. E. (1929)
TERRACING TO PREVENT EROSION. Mo. Agr. Col. Ext. Cir. 317, 19 pp., illus. 1935.
"A terrace system is designed to reduce the quantity of runoff passing over a given area and to reduce the speed of the runoff." Types of terraces, terracing equipment and costs, the use of the farm level, maintenance of terraces, etc., are discussed.
- MASSEY, W. F. (1930)
SO-CALLED TERRACING IN THE SOUTH. Rural New-Yorker 77: 226. February 16, 1918.
The author takes issue with terraces made of ridges growing weeds, grass, and bushes. "You cannot start a gully without this concentration of the water, and the terrace banks are one of the most efficient means for gathering this head of water to break over and start the gully. I have often told the Southern farmers that their terracing is simply a relic of bad plowing and poor farming." Deep plowing is suggested.
- MATSON, HOWARD. (1931)
DESIGN AND CONSTRUCTION OF SODDED TERRACE OUTLET CHANNELS. Agr. Engin. 16: 321-322, illus. August 1935.
By means of charts and calculations based on the Manning formula, the writer gives plans of sodded terrace-outlet channels.
- MECKEL, F. A. (1932)
DOWN THE RIVER GOES YOUR FARM, BUT YOU CAN PEN IT UP AT HOME WITH TERRACES. Mo. Ruralist 73: 6, 18, 21. August 15, 1931.
Terraces will prevent much of the enormous losses from erosion. They are not difficult to make; they may be constructed at times when other work on the farm is not pressing. Equipment is usually available and only home labor is needed. The writer, an experienced engineer, tells how it is done.
- MERCIER, W. B. (1933)
AN EFFECTIVE METHOD OF PREVENTING THE EROSION OF HILL LANDS. U. S. Bur. Plant Indus. Doc. 706, 7 pp., illus. 1912.
"The author gives directions for laying out a system of broad terraces—a combination of the hillside ditch and the true terrace—for the control of water on hill lands. It is believed that this system is of particular value in the cotton-growing states where large areas are badly in need of some method of preventing the land from washing away."—Expt. Sta. Rec. 26: 323. 1912.
- MORRISON, CHARLES. (1934)
READY FOR RAIN. Capper's Farmer 48: 8. February 1937.
Experiments with terraces and contour rows on a cotton farm in Texas brought about the following results: From rows running with the slope the yield was 104 pounds of lint cotton per acre; from those on the contour 199 pounds; and on the contoured and terraced land 219 pounds per acre.
- MOSS, B. L. (1935)
HOW TO GET RICH LANDS: TERRACING AS A MEANS OF SAVING SOIL FERTILITY. Prog. Farmer (Eastern Ed.) 32: 282. March 3, 1917.
Rolling lands that wash during heavy rains should be terraced. Discusses terracing on sandy or clayey soils, and illustrates an inexpensive farm level for laying off terraces, and a device for throwing up terrace embankments.
- (1936)
HOW TO MAKE TERRACES. Prog. Farmer (Eastern Ed.) 31: 1339, illus. November 18, 1916.
The author describes different types of terraces for controlling water and preventing erosion on cultivated hillsides. A convenient device for throwing up terrace embankments is illustrated and explained, its total cost not over \$2.

- MURDOCK, H. E. (1937)
DIKER-RIDGER. Mont. Agr. Expt. Sta. Bull. 281, 12 pp., illus. 1933.
Investigation of means of preventing loss of water and soil from the dry-farm area resulted in the construction of dikes to hold water on the land until it had time to soak in, thus conserving moisture and preventing soil washing. Directions on dike construction are given.
- NEAL, S. L. (1938)
MORE AND MORE TERRACES. U. S. Ext. Serv. Rev. 8: 40, illus. March 1937.
"Rusk County, Tex., is working on a long-time program to control surface erosion. With the help of the soil conservation program and the county commissioners' court, they are making headway toward their goal . . ."
- NEFF, L. F. (1939)
TERRACING A FARM ECONOMY. Kans. State Bd. Agr. Bien. Rept. 28: 133-138, illus. 1932.
The author refers to various Kansas farmers who solved their individual soil-loss problems with terraces. A farm bureau extension program for the State also is described.
- NEWMAN, C. L. (1940)
EVERY STEP IN MAKING MANGUM TERRACE. Prog. Farmer (Ga.-Ala. Ed.) 38: 1136-1137, illus. December 1, 1923.
The author gives detailed instructions for the construction of Mangum terraces, "the best means by which soil-wash in cultivated fields may be reduced to a minimum." Each step of construction is illustrated.
- PREVENT ROLLING LANDS FROM ROLLING AWAY. Prog. Farmer (Car.-Va. Ed.) 42: 1083. October 22, 1927. (1941)
The author contends that good terraces will stop soil washing and help to reduce the South's greatest farm loss. He gives 16 rules for laying off, making, and maintaining the Mangum terrace.
- NICHOLS, M. L. (1942)
NEW DEVELOPMENTS IN TERRACING IN THE SOUTHEAST. Agr. Engin. 17: 393-394. September 1936.
Observations of studies to indicate trends in engineering practice and thought are presented. The favorable influence of cooperative terracing associations on erosion control is shown. The author describes studies made by himself and others at Meridian, Miss., in South Carolina, and in Alabama.
- and YODER, R. E. (1943)
NEW POWER EQUIPMENT FOR TERRACING. Agr. Engin. 16: 93-96, illus. March 1935.
Models of tractors and types of terraces used in Alabama are shown.
- NORMAN, C. A. (1944)
REDEEMING WORN-OUT HILLSIDES. Successful Farming 21: 12, 32, 33, illus. October 1922.
Practical terracing hints are given to check sheet erosion and gullying.
- NORTON, ROBERT A. (1945)
EXPERIMENTAL WORK IN TEXAS. Okla. Agr. Expt. Sta. Cir. 79: 18-19. 1931.
A paper read at the second Southwest Soil and Water Conservation Conference. Describes briefly the terracing experiments of the Bureau of Public Roads at the Temple, Tex., station.
- OLSEN, J. C. (1946)
HELPFUL HINTS ON TERRACING. Prog. Farmer (Eastern Ed.) 33: 238-239, illus. February 23, 1918.
Specific directions for the construction of terraces on cultivated land as a means of soil-erosion control are given. The author asserts that these terraces get better as they get older, the cost rarely exceeding \$2 an acre.

OLSEN J. C.

(1947)

TERRACING IN TEXAS. *Tex. Agr. Col. Ext. Bull.* 23, 32 pp., illus. 1916.

"Causes of erosion are laid to heavy rains, open winters, absence of humus or cover crops, disregard for laying-off of rows, shallow plowing, and poor methods of handling water. The extent of losses through soil erosion on the lands of Texas cannot be estimated." The importance of good tillage is stressed, and some general principles of terracing are stated with instructions for building.

(1948)

TERRACING IN TEXAS. *Tex. Agr. Col. Ext. Bull.* B-51, 27 pp., illus. 1919.

"This bulletin gives general information on methods of terracing best adapted to Texas soils. The use of a soil-saving dam and homemade equipment for terracing is also discussed . . . A terracing table showing vertical fall between terraces, distances between terraces, and fall along terraces for different soils is given."—*Expt. Sta. Rec.* 42: 888. 1919.

PARKER, T. B.

(1949)

SOME TERRACE BUILDING SUGGESTIONS. *Prog. Farmer (Eastern Ed.)* 33: 1438. December 28, 1918.

The author tells what conditions call for the laying out of the level terrace and lists factors that necessitate graded terraces. Construction hints for both types are given.

PARKINSON, E. J.

(1950)

TERRACE IRRIGATION PAYS DIVIDENDS. *Mont. Farmer* 23: 6-7, 20. May 1, 1936.

"A system of water conservation has been developed and practiced in recent years, in the vicinity of Miles City, particularly, that is destined to play an important part in the rehabilitation of agriculture in areas of insufficient precipitation for ordinary dry farming as practiced in the past. It has given such astonishing results during the drought years that it can safely be considered to have passed the experimental stage. It is a system of terracing that holds the water on the ground until it soaks in and is really quite simple. Dikes are constructed following the contours of the ground, placed at intervals from 0.5 foot to 1.0 foot vertically, depending on the slope of the ground. The diking is the secret of the phenomenal success of the system and they are simple and easy to build."

PATH, JACOB.

(1951)

THE TERRACING OF SLOPES FOR CITRUS PLANTATIONS. *Hadar* 9: 282-285. December 1936.

"Describes soil erosion measures which have been used successfully in Palestine for citrus plantations under irrigation."

PENDLETON, R. L., and CURRAN, H. M.

(1952)

PREVENTING SOIL EROSION IN FOREST NURSERIES. *Lingnan Sci. Jour.* 14: 439-443, illus. July 1935.

The authors advocate the use of Mangum terraces and contour furrows in forest nurseries of the Philippines for preventing soil erosion. "Simple and relatively inexpensive methods of laying out low terraces or ridges and furrows of suitable dimensions almost on the contour at appropriate intervals will entirely prevent soil erosion even on relatively steep slopes and even where the land must be stirred frequently in the handling of cultures." Some typical forest nurseries in China and the Philippines are illustrated.

PETERSON, R. V.

(1953)

TERRACES PREVENT EROSION. *Successful Farming* 28: 13, 83, illus. November 1929.

Information is given on checking soil erosion in Oklahoma. "Short terraces are to be preferred. Ordinarily they should not be more than 1,200 feet in length, under most conditions. There are some good terraces one-half mile in length, but in such cases the slope is not great and the absorption power of the soil is high." The construction and laying out of terraces are explained.

- PETERSON, V. S. (1954)
INSURE YOUR SOIL. *Successful Farming* 30: 5, 40, 41, illus. September 1932.

A discussion of terracing for erosion control in the Midwest and Southwest. As a supplementary method the author advises: "Before starting to terrace consider the cropping program to be followed and the possibility of the rearrangement of the fields for more efficient production." The various steps in the laying out and construction of terraces are explained.

- PHAGAN, C. V. (1955)
TERRACING IN OKLAHOMA. *Okla. Agr. Col. Ext. Cir.* 218, 32 pp., illus. 1935.

Discusses the evils of erosion, kinds of erosion and methods of control, history and progress of terracing in Oklahoma, the real value of terraces, building and maintenance of terraces, and cultivation of terraced fields.

- PHILLIPS, J. V. (1956)
TERRACING. *Ga. State Col. Agr. Misc. Pub.* 4 pp. illus. 1920.

Specific recommendations for various types of terraces are made. A scale for target settings in 25-foot intervals for laying off terraces is presented in tabular form.

- PITKIN, W. B. (1957)
MOUNTAIN AGRICULTURE. *Science (Sup.)* 62: 12-14. September 18, 1925.

Describes the value of terracing in erosion control. The author claims that proper terracing will check soil washing on slopes with as high as a 40° pitch and cites the work of Virginia and Carolina farmers.

- QUESENBERRY, G. R. (1958)
MOISTURE CONSERVATION IN NEW MEXICO. *Ext. Serv. Rev.* 2: 69, illus. May 1931.

"From 5,000 to 7,000 acres of land have been terraced and contoured in several counties in New Mexico because of the obvious difference in crop production that terracing makes."

- RAMSER, C. E. (1959)
CONTROL OF SOIL EROSION BY TERRACING. *Agr. Engin.* 15: 164-166, illus. May 1934.

"The terracing experiments on the various Federal soil erosion experimental farms are planned so as to answer important questionable matters relating to the best terrace design and practices." The author gives detailed information as to the use and value of terraces with other important data as to spacing, grading, and the terracing of steep slopes. Control measures on the Guthrie, Okla., Federal soil-erosion experimental farm, and a tractor planter in use, are illustrated.

- FARM TERRACING. (1960)
U. S. Dept. Agr. *Farmers' Bull.* 1669, 22 pp., illus. 1931.

"This is a revision of and supersedes *Farmers' Bulletin* 1386 . . . It presents practical information on methods of preventing erosion, the design and construction of the Mangum terrace, and the construction of other types of terraces."—*Expt. Sta. Rec.* 66: 78. 1932.

- NEED OF IMPROVED MACHINERY FOR TERRACE CONSTRUCTION AND FARMING TERRACED LAND. (1961)
Agr. Engin. 12: 39-42, illus. February 1931.

"Erosion is caused chiefly by the direct action of heavy rains beating upon the ground . . . If most of the rain water penetrated the ground upon which it falls, erosion would be greatly reduced." Hence the need for treatment and management of the land so that water flow and run-off may be retarded. New and improved machinery, more particularly adapted to this end, is needed. Various implements are illustrated.

- PREVENTING EROSION OF FARM LANDS BY TERRACING. (1962)
Agr. Engin. 9: 369-373, illus. December 1928.

The bench terrace and the Mangum, or broad-based terrace, are described and their construction and usage discussed. Diagrams show the making and working of terraces and of a new home-made implement widely used in Texas for throwing up terraces.

RAMSER, C. E.

(1963)

PREVENTION OF THE EROSION OF FARM LANDS BY TERRACING. Jour. Amer. Soc. Agron. 21: 430-432. April 1929.

The broad-base ridge terrace, the Mangum terrace, and its principle and design, are discussed in this article. "That terracing is regarded as important and essential to the maintenance of land values in Texas and Louisiana is exemplified by the fact that the Federal Land Banks of Houston and New Orleans require that land subject to soil washing be terraced before granting loans."

(1964)

PREVENTION OF THE EROSION OF FARM LANDS BY TERRACING. U. S. Dept. Agr. Bull. 512, 40 pp., illus. 1917.

"This bulletin is based upon the results of surveys, observation, and a study of terraced fields in the best terraced sections of the country, and deals with terracing as a means of preventing the erosion of hillside land, describing the different types of terraces, pointing out the applicability of each to the various kinds of soil and topography and discussing the principles of terrace design . . ."—Expt. Sta. Rec. 37: 87. 1917.

(1965)

RESULTS OF ENGINEERING EXPERIMENTS AT THE SOIL EROSION STATIONS. Agr. Engin. 15: 381-386, illus. November 1934.

"These experiments are intended primarily to obtain information on the proper spacing, grade, height, cross section, and limiting lengths of terraces for any particular soil or land slope. Studies are also being conducted on the methods of constructing and maintaining terraces; the improvement of machinery for building terraces and farming terraced land; the proper size, location, and control of terrace outlet ditches, and improved methods of farming terraced land." Tables are given showing run-off and soil losses from terraced and unterraced land at the Guthrie, Okla., Tyler, Tex., Pullman, Wash., Bethany, Mo., and La Crosse, Wis., experiment stations. Various terracing operations are illustrated.

(1966)

SOIL EROSION CONTROL BY TERRACING—HISTORY AND ACCOMPLISHMENTS. Agr. Engin. 14: 103-104, illus. April 1933. [Also in Engin. News-Rec. 111: 437-438, illus. October 12, 1933.]

Results of investigation of erosion problems and control by terracing are based on data obtained from 10 soil erosion experiment farms in the West and Southwest.

(1967)

TERRACE FAILURES OFTEN RESULT FROM ERRORS IN PLANNING AND BUILDING. U. S. Dept. Agr. Yearbook, 1931: 508-512, illus. 1931.

A discussion of some of the outstanding causes for terrace failures.

(1968)

TERRACES EFFECTIVE FOR CONTROLLING EROSION ON CULTIVATED LAND. U. S. Dept. Agr. Yearbook, 1934: 346-348, illus. 1934.

"The results of experiments by the Bureau of Agricultural Engineering are briefly summarized indicating the effectiveness of proper terracing in controlling sheet erosion. Terraces are equally effective in controlling and preventing the development of gullies. It has been observed that terracing generally improves fields for the operation of farm machinery by making the ground surface smoother."—Expt. Sta. Rec. 72: 111. 1935.

(1969)

TERRACING FARM LANDS. U. S. Dept. Agr. Farmers' Bull. 997, 40 pp. 1918

"Systems of terracing farm lands to prevent erosion are described, including the bench and the narrow, and broad-base ridge types. The methods employed in building terraces and their subsequent care are outlined. A more technical treatment of the subject has been presented in a previous publication."—Expt. Sta. Rec. 37: 87.

- RAMSER, C. E. (1970)
TERRACING FARM LANDS. U. S. Dept. Agr. Farmers' Bull. 1396, 20 pp., illus. 1928.

This bulletin describes causes and forms of erosion, methods of preventing erosion, the Mangum and the level terrace, terrace outlets, laying off and building of terraces, their care and cultivation.

- (1971)
TERRACING TO COMBAT SOIL EROSION LOSSES. Engin. News-Rec. 103: 848-851 illus. November 28, 1929.

This article presents the results of terracing in the Southern States. Engineering phases of soil conservation, with instructions for terrace building, are described.

- REYNOLDS, M. R. (1972)
TERRACING FIRST AID IN WATER-WASHED FIELDS. Prog. Farmer (Ga.-Ala. Ed.) 35: 6. December 4, 1920.

Broad terraces turned a gullied waste into a cornfield. In this article the writer discusses terracing and other methods for reducing soil washing. A home-made drag for throwing up terraces is illustrated. The author concludes that it is better to have too many terraces than too few.

- RICHARDSON, T. C. (1973)
HUNDREDS SEE TERRACING AT HOLLANDALE; SECOND REGIONAL TERRACING DEMONSTATION WAS A BIG SHOW OF METHODS AND MACHINES. Farm and Ranch 50: 1-2, 13, illus. July 25, 1931.

Gives a description of the demonstration which was held near Dallas, Tex. "Fourteen terracing rigs were on the field and terraces were built with every type of earth-moving implement from disk plows to giant road graders."

- RIESBOL, H. S. (1974)
SELECTION OF CHANNEL GRADE FOR TERRACES. Agr. Engin. 16: 308-312, illus. August 1935.

"It is the purpose of this paper to present an analysis of the theoretical considerations, experimental results and conclusions from these experiments in order that the agricultural engineer working on terrace design . . . may have a working basis for selection of terrace channel gradient." These studies were conducted at the Guthrie, Okla., experiment station.

- ROBERTS, G., KELLEY, J. B., AND WELCH, E. G. (1975)
SOIL EROSION. Ky. Agr. Col. Ext. Cir. 129, 34 pp., illus. 1922.

Information is presented on preventing erosion of Kentucky soils by means of terracing and soil-saving dams.

- ROBERT, R. H. (1976)
CONTOUR RIDGES. Rhodesia Agr. Jour. 29: 269-272. April 1932.

The author presents some general data on the construction of contour ridges for erosion control.

- (1977)
SOIL EROSION: NOTES ON CONTOUR RIDGING. Rhodesia Agr. Jour. 27: 841-845. August 1930.

The purpose of this paper is to present briefly instructions on contour ridging in Rhodesia and to give an itemized estimate of costs. The paper also suggests two crops, Sunn hemp and maize, for ridge planting.

- ROE, H. B. (1978)
TERRACING FOR SOIL EROSION CONTROL. Minn. Col. Agr. Ext. Div. Agr. Engin. News Letter 17, 1 p., illus. 1933.

Instructions are given for building terraces. Terracing equipment is described.

- ROTAN, JOHN H. (1978)
LEVEL TERRACES ARE EFFICIENT. Farm and Ranch 51: 13. June 15, 1932.

"A summary of last year's work in terracing in the Hill Country [of Texas] where average fall of land is much greater than in more level sections, proves the value of the level terrace beyond a doubt." The author cites many local instances of the durability of the level terrace.

- SAMSEL, L. G.** (1980)
 LOW COST TERRACE BUILDING. Farm Machinery and Equipment 1780: 12, illus. April 15, 1932.
 The use of a wheat-land plow in terracing costs little and is speedy. This is the proved opinion of Professor Nichols of the Alabama Polytechnic Institute. Various other advantages to be gained are discussed.
- SCOATES, D.** (1981)
 SAVE THE SOIL YOU'VE GOT. Country Gent. 94: 12, 142, illus. February 1929.
 In Texas terraces are being built that keep land and rainfall on the farm. Water can be impounded in reservoirs and put back on the land by irrigation, but better still is it "to hold a large percent of it on the land on which it falls in the form of rain." The author emphasizes the necessity for a thorough knowledge and study of terracing. Illustrations of methods and a terracing table are included.
- SEITZ, C. E.** (1982)
 BUILD TERRACES TO EFFECTIVELY CONTROL EROSION. Tobacco Grower 1: 11, illus. May 1933.
 Briefly outlines the advantages of erosion control by terracing. In Texas an analysis of 200 foreclosed farms showed that 70 percent were definitely classed as badly eroded. This could have been averted by proper terracing. Costs are given at \$2 to \$2.50 an acre.
- SHEDD, C. K.** (1983)
 DESIGN OF THE MANGUM TERRACE. Agr. Engin. 10: 225-226, illus. July 1929.
 The author states: "I have observed enough examples of successful terracing to be firmly convinced that this practice can be adapted to Corn Belt conditions." He goes on to outline briefly some methods of attacking the problem of terrace design.
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- (1984)
 ERODED AND TERRACED FARMS REQUIRE SPECIAL METHODS AND MACHINERY. U. S. Dept. Agr. Yearbook 1932: 446-449, illus. 1932.
 Flexibility in machines for terraced fields is essential on steep slopes.
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- (1985)
 TERRACING FARM LANDS. Mo. Agr. Expt. Sta. Cir. 248, 10 pp., illus. 1930.
 This paper gives practical information on farm terracing. Instructions cover the location of terrace lines; the proper distance between terraces; surveying the terrace line; construction of terraces; their grade and length; terrace maintenance; cultivation of terraced land.
- SHIPMAN, R. C.** (1986)
 PROPER TERRACING. Purdue Agr. 31: 117. June 1937.
 Data are presented on the improvement of terrace outlets, the location of terraces, spacing between terraces and terrace width, terrace lengths, and grades of channel.
- SHORT, A. K.** (1987)
 THE BANK'S INTEREST IN SOIL EROSION. Agr. Engin. 10: 289-290. September 1929.
 The necessity for terracing rolling lands is insisted upon by the Houston Federal Land Bank when making loans to farmers, to "insure the permanency of soil fertility during the life of the loans."
- SMITH, H. P.** (1988)
 TYPES OF TERRACING MACHINERY USED IN TEXAS. Agr. Engin. 12: 43-44, illus. February 1931.
 "Machines used in Texas to build terraces vary in size and cost, from the small walking plow costing not more than \$25, to the 60-horsepower track-laying type tractor hauling a large road machine having a 12-foot blade . . . costing in the neighborhood of \$7,000." Various implements are described and illustrated: terracers, disk harrows, ditchers, graders.
- SPILLMAN, W. J.** (1989)
 RENOVATION OF WORN-OUT SOILS. U. S. Dept. Agr. Farmers' Bull. 245, 16 pp. 1906.
 On page 10 of this bulletin the control of soil washing by terracing is briefly discussed.

- SPUY, M. J. VAN DER (1990)
TERRACES AND SOIL EROSION. *Farming in So. Africa* 7: 31-32, illus. April 1932.

The author urges that the vegetal covering be saved to prevent soil erosion. Terracing in the Mangum or bench way and contour plowing will affect the concentration of rain water and retard its velocity.

- STEELE, W. A. (1991)
TERRACING AND MAINTENANCE. *Farm Machinery and Equipment*, (1825): pp. 28, 30. January 15, 1936.

Terracing and maintenance are made easy for the farmer by low cost and efficiency of individual farm outfits. The author gives figures on some recent demonstrations.

- (1992)
TERRACING AS EASY AS PLOWING. FARMERS ARE USING THEIR OWN INDIVIDUAL EQUIPMENT AT A BIG SAVING. *Farm Machinery and Equipment* No. 1842, pp. 12-13, illus. June 15, 1937.

Advantages of individual farm equipment are compared with those of "large outfits costing thousands of dollars." Terracing cost figures are included.

- STOCKDALE, F. A. (1993)
SOIL EROSION. *Ceylon Dept. Agr. Yearbook* 1926: 3-4, illus. 1926.

An account, among other things, of experiments in stone terracing and contour planting of both rubber and tea.

- SUNDERLIN, H. H. (1994)
KEEPING THE FARM AT HOME. *Wallaces' Farmer* 49: 297, illus. February 22, 1924.

The writer describes the construction of soil-saving terraces, with plow and grader, on a 35-acre field in Iowa.

- and CLYDE, A. W. (1995)
THE RIDGE TERRACE. *Iowa Agr. Col. Ext. Bull.* 96, 8 pp., illus. 1922.

"The principle of the terrace is to hold back the hillside water in such amounts that it will not do damage to the surface soil. In the southern states the terrace has been doing effective work for a long number of years." The bench or step terrace, the ridge terrace, and construction methods are described and illustrated.

- TAPSON, C. (1996)
THE USE OF DITCHERS FOR CONSTRUCTING CONTOUR RIDGES. *Rhodesia Agr. Jour.* 32: 603-606. September 1935.

Suggestions on the best methods of operating ditchers in the construction of contour ridges are offered.

- TEXAS AGRICULTURAL EXTENSION SERVICE (1997)
TERRACES: A GOOD INVESTMENT. *Tex. Agr. Col. Ext. Leaflet* L-3, 4 pp., illus. 1925.

Eight reasons for terracing farms and suggested terracing methods are presented. "An investment of \$2.50 per acre in terraces frequently yields an annual dividend of \$10.00 per acre."

- TREADWELL, J. C. (1998)
CONTOUR TERRACING IN HEVEA PLANTING. *India Rubber World* 73: 71-72, illus. November 1, 1925.

A system of soil and moisture conservation applied to the cultivation of rubber trees on hilly land is described and illustrated.

- UNITED STATES EXTENSION SERVICE (1999)
OKLAHOMA COUNTY STIMULATES TERRACING. *U. S. Ext. Serv. Rev.* 4: 123, illus. December 1933.

The terracing program of Seminole County, Okla., is outlined.

- (2000)
TERRACING: A PROBLEM OF LAND UTILIZATION. *U. S. Ext. Serv. Rev.* 5: 57-58. April 1934.

The writer sketches the development and results of intensive terrace campaigns in three Arkansas counties.

UNITED STATES EXTENSION SERVICE.

(2001)

TERRACING IMPROVES THE LAND. U. S. Ext. Serv. Rev. 4: 124, illus. December 1933.

"The story of marvelous benefits from terracing land is an old one in Texas." Describes the agricultural rehabilitation of farms in east Texas.

UNIVERSIDAD DE TUCUMAN.

(2002)

TERRACING OF FIELDS. Tucumán Univ. Ext. Agr. Bol. 36: 1-10, illus. 1919.

"Features of land terracing to prevent soil erosion, as practiced in Argentina, are discussed."—Expt. Sta. Rec. 43: 481. 1920.

VAN DOREN, LOYAL.

(2003)

SINK HOLE TERRACE OUTLETS IN MINNESOTA. Soil Conserv. 1: 10, illus. February 1936.

"The sink hole, as the name implies, is formed by the sinking of a small area of land which has been undermined . . . The large gullies which cannot be controlled by vegetation can be controlled by the use of diversion ditches or dikes around the gully which empty into the sink holes . . ."

WARD, G. H.

(2004)

COOPERATIVE OWNERSHIP MAKES TERRACING PROFITABLE. U. S. Ext. Serv. Rev. 7: 105, 111. July 1936.

General policies of county farmer associations incorporated for the purpose of acquiring power-terracing equipment is discussed. "In order to cover expenses, the analysis of operating costs for 1935 indicated that a terracing association must keep its outfit working at least 105 working days during the year." The average cost of protecting an acre of land with terraces was found to be \$1.44 during 1935.

(2005)

THE COST OF TERRACING FARM LAND COOPERATIVELY. Jour. Farm Econ. 18: 765-768. November 1936.

Cooperative terracing associations in Virginia have brought the cost of terracing down to an average of \$1.44 per acre.

(2006)

EIGHT VIRGINIA COUNTIES FIND THAT COOPERATIVE OWNERSHIP MAKES TERRACING PROFITABLE. U. S. Ext. Serv. Rev. 7: 105, 111. July 1936.

Discusses general policies and activities of county terracing associations of Virginia, in acquiring power-terracing equipment to build terraces to conserve land fertility.

WELD, WILLIAM A.

(2007)

A NEW MACHINE FOR SCARIFYING TERRACE CHANNELS. Soil Conserv. 2: 214, illus. March 1937.

WILKINS, MITCHELL.

(2008)

TERRACES WITH ONE-HORSE EQUIPMENT. Prog. Farmer (Ga.-Ala. Ed.) 52: 16, illus. January 1937.

The author describes a plow rigged up with a saw blade, a practice followed successfully in Walton County, Fla., in making terraces. Instructions for use are included.

WILSON, N. W., and NICHOLS, M. L.

(2009)

THE SIZE OF TERRACING EQUIPMENT, WITH DISCUSSIONS BY H. W. LINDSEY, JOHN S. GLASS, E. V. COLLINS, LEONARD S. FLETCHER, AND P. W. BAIRD. Agr. Engin. 17: 55-57, illus. February 1936.

Results obtained from tests of terracing machines are here presented in response to a general inquiry as to the most economical size of power-terracing unit. The tests were made in Alabama.

WOOD, I. D.

(2010)

PRACTICAL METHODS OF MOISTURE CONSERVATION ON ORCHARD LANDS. Nebr. State Bd. Agr. Rept. 1935: 527-534, illus. 1935.

Terraces to conserve moisture and check orchard erosion are prescribed.

WOOD, I. D.

(2011)

TERRACES AS A CURE FOR SOIL EROSION. *Successful farming* 23: 11, 43, illus. August 1925.

Brief instructions and practical hints on the construction of bench and ridge terraces are given. The topographical features calling for each type are described.

(2012)

TIPS ON TERRACING. *Nebr. Farmer* 73: 3-4, illus. September 12, 1931.

This article presents data on the advantages of terracing in erosion control. The author states that terracing costs have shown a tendency to vary and quotes comparative costs per acre for Nebraska.

WOOLEY, J. C.

(2013)

DEVELOPMENT OF A TERRACE BUILDING MACHINE. *Agr. Engin.* 16: 4-5, illus. January 1935.

(2014)

EFFICIENCY OF TERRACING MACHINES. *Agr. Engin.* 13: 182-183, illus. July 1932.

"Widespread adoption of the practice of terracing farm lands indicates that the practice is here to stay." Methods and equipment for construction of terraces has therefore become of primary importance. Experiments made at the University of Missouri with a number of terracing machines are described and illustrated.

(2015)

EROSION CONTROL IN TERRACE OUTLETS. *Agr. Engin.* 17: 208-209, illus. May 1936.

Describes a terrace-outlet structure which was made of rubble masonry laid up in concrete mortar and plastered. As an extra precaution against seepage, the earth was cut to shape for the structure and a coating of road oil applied before concrete was started. A flume carrying the water down the 45° slope was built of rubble masonry and plastered smooth. Paper presented at a symposium on engineering phases of soil erosion control. Soil and Water Conservation Division of the American Society of Agricultural Engineers, Chicago, December 5, 1935.

(2016)

MISSOURI TERRACING FRAME. *Agr. Engin.* 8: 149. June 1927.

The terracing frame described in this article was designed to simplify the process of spacing and laying out and checking terraces, so that the farmer could do this work without so much personal service.

FLOOD CONTROL AND RELATED SUBJECTS

ANONYMOUS.

(2017)

ACTIVITIES OF THE NATIONAL WATER RESOURCES COMMITTEE. *Civ. Engin.* 7: 167-177, illus. March 1937.

Abstracts of papers delivered at the flood-control symposium of the American Society of Civil Engineers' meeting held in Pittsburgh, January 20, 1937. They are as follows: Resumé of the Drainage Basin Study Report, by Abel Wolman; The National Drainage Basin Study, by F. H. Fowler; Water Plan for the Red River of the North, by W. W. Horner; The Rio Grande Joint Investigation, by H. H. Barrows; and Collecting and Publishing Hydrologic Data, by Thorndike Saville.

(2018)

CAN WE CONTROL FLOODS? CONFERENCE AT COLUMBUS RECOMMENDS BUILDING RESERVOIRS. *Ohio Farmer.* 179: 125. February 13, 1937.

Highlights of conference held February 3, 1937, are cited. Endorsement given to H. R. 3686, which would authorize Congress to appropriate \$150,000 for building reservoirs and buying land is discussed. The responsibility would be placed on the Government "to establish the Ohio Valley Authority which would coordinate all flood-control activities, buy lands, call on the Forest Service, the Soil Conservation Service, and other branches of the government."

ANONYMOUS.

(2019)

COMMITTEE ON NATIONAL WATER POLICY. Civ. Engin. 7: 196-198. March 1937.

Report of national water policy committee of the American Society of Civil Engineers. Hydrologic data, water supply and pollution, and flood control are discussed.

(2020)

CONFERENCE SEEKS FLOOD CONTROL ACTION; FORESTERS AND ENGINEERS STRESS COMPREHENSIVE PLANS FOR MAJOR WATERSHEDS AT 62ND ANNUAL MEETING OF THE AMERICAN FORESTRY ASSOCIATION. Amer. Forestry. 43: 344-346, 354, 363-365, illus. July 1937.

(2021)

COORDINATING FLOOD CONTROL WORK. GOV'T AGENCIES MEET TO COORDINATE THE VARIOUS OBJECTIVES SOUGHT—WORK WILL BE STARTED WITH RELIEF FUNDS. Engin. News-Rec. 117: 136. July 23, 1936.

"The intention of the Water Resources Committee is to develop methods by which flood control activity may go ahead while collateral objectives of other agencies of the Government in emergency flood control areas, such as conservation, reforestation, etc., proceed as expeditiously as possible."

(2022)

DRY HUMOR? (Editorial.) Engin. News-Rec. 117: 96. July 16, 1936.

Refers to a conference on upstream engineering, called by the President to meet in Washington in September 1936. Ridicules forestry and land-management projects for the control of floods and drought prevention.

(2023)

ENGINEERING REPORTS ON RECORD FLOODS FROM NEW ENGLAND TO POTOMAC. Engin. News-Rec. 116: 441-446, 469, illus. March 26, 1936.

Symposium on catastrophe flood of March 1936, which affected 10 North-eastern States: Johnstown Flood Rivals '89 Dam Break, by H. W. Richardson; Pittsburgh Experiences Maximum Flood, by N. B. Jacobs; Susquehanna Floods Highest on Record, by H. W. Richardson; Hydrology of New England Flood Exceeds That of 1927, by V. T. Boughton; Hudson Crest Reduced by Reservoir, by E. H. Sargeant; Utility Damage in New England, by H. S. Knowlton; Damage to Roads and Railroad Lanes, by I. D. Foos.

(2024)

EROSION CONTROL CHECKS FLOODS. Sci. Amer. 154: 326-327, illus. June 1936.

H. H. Bennett is quoted as follows: "Our work the last two years, in 141 watersheds throughout the country, indicates that the volume of run-off water can be reduced 20 to 25 percent through the use of erosion-control methods. This is the margin, in most cases, between mere high water and destructive floods . . . Coordination of efforts in cultivation methods, in reforestation, and in the design of control structures, are necessary factors for a successful erosion control practice."

(2025)

FLOOD CONFERENCES DISAGREE ON CONTROL PROCEDURES. Engin. News-Rec. 118: 281. February 18, 1937.

This paper calls attention to the divergent views of the Ohio Chamber of Commerce to those agreed upon at the Ohio Valley Flood Control Conference of February 3, 1937, relative to flood control.

(2026)

FLOOD CONTROL. Science 84: 9-10. July 3, 1936.

Announces that problems of upstream engineering in relation to flood control and land conservation will be discussed at a conference of experts from the United States and foreign countries in Washington, on September 22 and 23. Members of the committee are H. H. Bennett, Chief of the Soil Conservation Service; Morris L. Cooke, Administrator of the Rural Electrification Administration, and F. A. Silcox, Chief of the Forest Service. A letter from President Franklin D. Roosevelt, on the need for coordination "of land-use principles with existing knowledge of down stream engineering methods in Federal planning for flood control and land conservation", was made public.

ANONYMOUS.

(2027)

FLOOD CONTROL AT THE SOURCE. Farm and Ranch 55: 18. September 1, 1936.

The building of small dams to hold rain water where it falls is advocated. In Callahan County, Tex., a dam-building machine has been invented which is speedy and economical.

(2028)

FLOOD CONTROL FEATURED BY CONFERENCE. Amer. Forests 42: 459-462. October 1936.

Summarizes the proceedings of the American and Pennsylvania Forestry Associations meeting held September 9-11 in Eagles Mere, Pa. "The need of a more intensive educational program in all phases of conservation was recognized by the conference, and a program enlisting the active interest of states, counties, communities, and individuals was urged." The C. C. C. program was endorsed, the program of the United States Forest Service was discussed by speakers, and the need for research in wildlife protection and restoration was stressed.

(2029)

FLOOD CONTROL FEDERATION ORGANIZED IN WASHINGTON. Engin. News-Rec. 116: 748. May 21, 1936.

(2030)

FLOOD CONTROL. OMNIBUS FLOOD CONTROL BILL PASSED BY THE SENATE, AND MISSISSIPPI RIVER BILL APPROVED BY THE HOUSE. Engin. News-Rec. 116: 793. May 28, 1936.

Discusses the new provision added to the flood-control bill, which places the Soil Conservation Service of the Department of Agriculture in charge of waterflow retardation and soil-erosion prevention on watersheds. A brief history of the flood-control bill is given.

(2031)

A FLOOD-CONTROL POLICY. (Editorial.) Engin. News-Rec. 116: 821. June 4, 1936.

Comment on the "omnibus" flood-control bill, passed by the House in 1935 and rewritten by the Senate in 1936, to include the provision that the Soil Conservation Service and the Corps of Engineers shall study and report upon flood control projects.

(2032)

FLOOD CONTROL WORK IN THE RIO GRANDE DELTA. RESTRICTION OF THE MAIN RIVER CHANNEL IN THE DELTA REGION MAKES FLOODWAYS NECESSARY. INTERNATIONAL BOUNDARY COMMISSION COOPERATES WITH THE COUNTIES IN LEVEE AND FLOODWAY CONSTRUCTION. Engin. News-Rec. 116: 407-411, illus. March 19, 1936.

The writer discusses the topography of the Rio Grande delta district with reference to irrigation and flood control. Details of costs and benefits are given, as well as descriptions of bank protection and inlet controls.

(2033)

HOW THE FARMER CAN AVERT THE DANGER OF FLOODS. Current Opinion 62: 61, illus. January 1917.

The writer quotes largely from an article by J. Russell Smith in the Century Magazine, in which it is contended that the rain can be kept where it falls in little water pockets or field reservoirs. Examples of places where this has been done very successfully are given and illustrated. Large reservoirs and levees are futile for flood cure; the water-pocket system could be practiced on slopes or on level ground at a great saving.

(2034)

IMPORTANT FACTORS IN FLOOD CONTROL. Agr. Engin. 8: 160. June 1927.

The need for a well-established policy of flood prevention is stressed. Among the recommendations of the Department of Agriculture are: "The general reduction of soil erosion to prevent rapid run-off and the clogging of streams; largely increased efforts by the states and Federal Government and private owners for cooperative forest fire control; largely increased programs for public forests or tributary tree planting on denuded forest lands . . ."

ANONYMOUS.

(2035)

MAN-MADE FLOODS. New Repub. 86: 210. April 1, 1936.

Quotes H. H. Bennett and Paul B. Sears concerning serious floods in the United States as the result of bad agricultural methods, and advocates Federal public-works project as the proper agency for flood-control operations.

(2036)

MISSISSIPPI FLOODS. Forester 3: 57-58. May 1897.

The writer points out the need of reforestation along headwaters but believes the difficulty to be more a matter of silt and mud than of water. "Certainly the construction and care of levees will always be a necessity. Forests would not only regulate and hold back the waters, but would accomplish something which is more important: They would prevent erosion, and thus materially decrease the amount of silt."

(2037)

NAVIGATION AND POWER ON THE TENNESSEE. Engin. News-Rec. 117: 860-865, illus. December 17, 1936.

The Tennessee river experiment—III. River canalization planning by the Tennessee Valley Authority involves many physical and economic problems, including the relation of dam locations and the coordination of operating schedules to the needs of navigation, flood protection, and power production.

(2038)

THE PITTSBURGH MEETING OF THE AMERICAN SOCIETY OF CIVIL ENGINEERS. Science 84: 253-284. 1936.

A discussion of 1936 floods and flood control.

(2039)

"THE EARTH DISEASE." (Editorial). Amer. Forestry 42: 213. May 1936.

An editorial discussing floods as the result of misuse of soils and mismanagement of lands, with suggestions for research studies in watershed problems and watershed forestation.

(2040)

TO PLAN FOR CONTROL OF FLOODS, EROSION, AND WATER POLLUTION. Amer. City 51: 5. April 1936.

A description is given of the national water plan, to be submitted to President Roosevelt before December 1, 1936, by the National Resources Committee. Also lists the several Federal agencies concerned with water problems, i. e., control of floods, erosion, and water pollution, uses of water for domestic purposes, irrigation and power, and drainage of waterlogged and overflowed lands.

(2041)

THE PROBLEM OF FLOOD CONTROL. Plan Topics 2: 6-7, 14, illus. February 1937.

"Tennessee has shared in the movement to establish an Inter-state Commission on the Ohio Basin, for the express purpose of evolving flood prevention measures in the Ohio system." The meetings at Columbus and Indianapolis are discussed.

(2042)

RIVER DEVELOPMENT ON TRIAL. Engin. News-Rec. 117: 929-933, illus. December 31, 1936.

The Tennessee Valley experiment—V: With a large amount of construction accomplished, the T. V. A. to date has not demonstrated that returns will justify its expenditures, and its experience throws little light on how river development is best carried on.

(2043)

SEVERE EROSION IN LATERAL STREAMS CHECKED BY THE ERIE. Ry. Age 100: 206-209, illus. February 1, 1936.

Describes the effectiveness of flow-retard works of the Erie Railway Co. in controlling flooded lateral streams in New York State. From 1932 the construction of spillways was carried on, the principal aim being to produce noneroding flow in the streams, even at flood stage. Flood conditions proved this check-dam system to be highly effective in retarding flood torrents and

at the same time in depositing rock and silt in the concrete flume at a point below the railroad, saving tracks and bridges from serious damage.

ANONYMOUS.

SOIL EROSION ECONOMIC WASTE. Agr. Rev. 18: 8. November 1925.

(2044)

Indicates the relation between flood control and soil conservation in the Mississippi and Missouri River Valleys and maintains that the levee system of the War Department is inadequate. Gives a program of control embodying the construction of spillways, diversion dams, and weirs.

(2045)

SYMPOSIUM ON FLOODS FEATURES N. E. W. W. A. MEETING. Engin. News-Rec. 117: 481-483. October 1, 1936.

Summary of papers presented at fifty-fifth annual convention of the New England Water Works Association, in New York City, September 22, 1936. "Public health aspects and hydrology of the 1936 floods received major attention at four-day convention in New York City devoted to water works problems."

(2046)

TWENTY-DAY STORM CAUSED FLOODS. Engin. News-Rec. 118: 156, illus. February 4, 1937.

A review of conditions preceding the 1937 floods with map showing rainfall and table giving flood discharges at gaging stations of United States Geological Survey.

(2047)

WATER CONSERVATION AND FLOOD CONTROL. Engin. News-Rec. 117: 823-827, illus. December 10, 1936.

The Tennessee Valley experiment—II: Water phases of the T. V. A. studies are outlined, including mention of Tennessee River flow data, multipurpose reservoirs, distribution of storage, reservoir allocations, analysis of flood problem, and flood estimation. "To save wasted flow for summer supply and to prevent destructive floods of the Tennessee the engineers had to forecast water supply variations, compare different regulation plans, and decide on best storage."

(2048)

WHAT PRICE FLOOD CONTROL. (Editorial.) Amer. Forests 43: 173. April 1937.

The President is credited with having done more to advance the work contemplated by the Weeks Act of 1911 than any other President, not by asking Congress for direct appropriations but by allocations of emergency funds already appropriated. Legislation and expenditures on flood control are discussed.

ADAMS, HENRY R.

(2049)

MEASURING THE VENGEANCE OF A SINGLE STORM. Soil Conserv. 2: 32-33, illus. August 1936.

"At Ithaca, N. Y., studies of erosion caused by one severe storm [July 7 and 8, 1935] show clearly that erosion is governed by type of soil, vegetative cover, and steepness of slope."

AIKMAN, DUNCAN.

(2050)

MAN HELPS NATURE CREATE FLOODS. Conservation 2: 1. April 1936.

Weather conditions which preceded the 1936 flood of the Potomac, Shenandoah, Susquehanna, Monongahela, Ohio, Connecticut, and Merrimac Rivers and their tributaries are described; and flood protection by reservoirs, dams, and retarding basins advocated. Basic flood control "must begin behind the lines of dikes and levees and even behind the flood protection fortifications of dams and storage reservoirs. The Nation's only real flood safety lies in a Nation-wide program of crop adaptation, rotation and reforestation calculated to hold American topsoil, particularly that of hilly and mountainous regions, where it belongs and to give it the utmost degree of porosity."

ALTER, J. C.

(2051)

MUD FLOODS IN UTAH. U. S. Monthly Weather Rev. 58: 319-321, illus. August 1930.

"Numerous rapid and heavy local downpours of rain during the first 2 weeks in August produced an extraordinary number of washing floods in

the mountain sections of Utah." The erosion caused by these floods was tremendous and is fully described.

ALFORD, J. W. AND BURDICK, C. B.

(2052)

RELIEF FROM FLOODS; THE FUNDAMENTALS OF FLOOD PREVENTION, FLOOD PROTECTION AND THE MEANS FOR DETERMINING PROPER REMEDIES. 175 pp., illus. New York, McGraw-Hill Book Co., Inc. 1918.

"The aim of this book has been to outline briefly the general flood problem in all its many phases, to show what remedies can be applied, and to point out the way to the selection of the proper works." Chapter VII deals with flood prevention by water storage.

AMERICAN SOCIETY OF CIVIL ENGINEERS.

(2053)

FLOOD PROTECTION DATA, PROGRESS REPORT OF THE COMMITTEE. Amer. Soc. Civ. Engin. Proc. 62: 203-206, February 1936. [Discussion, Proc. 62: 970-972, 1096-1099, 1491-1495, 1936; 63: 218-221, 406-408, 1937.]

"The activities of the Committee on flood protection data, during 1935, have been centered on acting in an advisory capacity to the Water Planning Committee of the National Resources Board in connection with the compilation and analyses of flood data undertaken with an allotment of funds disbursed by the Public Works Administration. The data were compiled, analyzed and prepared by the Water Resources Branch of the United States Geological Survey . . . and have recently appeared in published form as U. S. Geological Survey Water Supply Paper 771, entitled: 'Floods in the United States, Magnitude and Frequency.'" Recommendations as regards future flood-data compilations are listed. This article discusses the recommendations set forth in the progress report of the Committee on Flood Protection Data.

In the discussion by C. R. Pettit, pages 970-972, it is stated that "there are three independent methods of determining probable 100-yr. flood values: (1) The width formula, which does not require a river record at an individual station but the coefficient in the formula must be determined from adequate records of a group of rivers; (2) the Foster method (or some other similar method), which is based on a record at an individual station covering at least 35 years; and (3) the unit-graph method which is based on a careful study of an especially selected storm and its run-off."

In the discussion by J. C. Hoyt and C. S. Jarvis, pages 1096-1099, the following statement is made: "Technical studies may be directed along two lines: (1) The collection of physical and other data; and (2) analyses and discussions based on these data . . ." The Sacramento flood-control project is discussed.

Further discussion by G. W. Williams, M. Bernard, and G. W. Holmes is given in Proceedings 62, pages 1491-1495, and by C. D. Curran and E. N. Whitney in Proceedings 63, pages 218-221, January 1937.

In the discussion by C. H. Eiffert in Proceedings 63, pages 406-408, February 1937, the centralization or combination of all Government agencies that have to do with meteorological or hydrological records is suggested.

(2054)

NATIONAL ASPECTS OF FLOOD CONTROL. A SYMPOSIUM. Amer. Soc. Civ. Engin. Proc. 63: 423-537, illus. March 1937.

Contents: Federal Responsibility for Flood Control, by J. J. Davis, pages 423-428; Problems in Developing a National Flood Protection Policy, by Abel Wolman, pages 429-439; The Economic Aspects of Flood Control, by N. B. Jacobs, pages 441-448; Flood Conditions in New England, by W. F. Uhl, pages 449-483; The New York Floods of 1935 and 1936, by A. W. Harrington and Hollister Johnson, pages 485-493; Floods in the Upper Ohio River and Tributaries, by E. K. Morse and H. A. Thomas, pages 495-518; An Ideal Organization for the River and Flood Service of the United States Weather Bureau, by Montrose W. Hayes, pages 519-522; and Federal Plans for Flood Control, by W. E. R. Covell, pages 523-537.

ANDREE, H. J.

(2055)

FLOOD IN THE WILLAMETTE VALLEY IN FEBRUARY AND MARCH 1910. U. S. Monthly Weather Rev. 38: 474-475, illus. March 1910.

A brief review of the causes of floods in the Willamette Valley. They are described as (1) unusually heavy precipitation, (2) the rapid melting of snow on the western slopes of the Cascades, and (3) the unusual high

stage of the Columbia River which was 9 feet above normal at the time. Tables show the stages of water at several gaging stations and the dates and maximum levels of other floods.

- ANTHONY, HAROLD G. (2056)
EROSION DEFENSES WITHSTAND POUNDING OF RECORD RAINS. *Soil Conserv.* 2: 41-43, 57, illus. September 1936.

The author contrasts results of proper erosion-control measures at Plum Creek, Tex., during torrential rains and flood waters with noncontrol results. He quotes the project manager of the area comprising Caldwell and Hays Counties. "Cover crops, well-planned rotations, and contour cultivation are all integral phases of our program." It is further suggested that all land in a watershed area should be under intelligent erosion-control management to lessen flood hazards.

- AYRES, H. B. (2057)
THE MAY FLOOD IN EASTERN TENNESSEE. *Forestry and Irrig.* 8 (pt. II): 109-111, illus. March 1902.

Various phases of mountain torrents are commented on, and resultant damage is estimated. "The value of the retarding effect of forest debris is a factor very difficult to determine." Mountaineers, who are close observers of such matters, say that where the ground is well covered by brush, leaves, and humus, and where roots make the soil porous, water is greatly retarded causing more of it to soak into the earth, while on cleared land, especially old pastures, where the earth is compacted clay, water runs off rapidly.

- BAILEY, R. W., and CROFT, A. R. (2058)
CONTOUR-TRENCHES CONTROL FLOODS AND EROSION ON RANGE LANDS. *U. S. Emergency Conserv. Work Forestry Pub.* 4: 22 pp., illus. May 1937.

"The purpose of this publication is to show the relation of the contour-trench system of flood and erosion control to the broader aspects of upstream engineering applicable to the Intermountain region, to describe the system in detail, and to give instructions for its application in the field, including methods of analyzing problem areas." Not examined.

- _____, FORSLING, C. L., and BECRAFT, R. J. (2059)
FLOODS AND ACCELERATED EROSION IN NORTHERN UTAH. *U. S. Dept. Agr. Misc. Pub.* 196, 21 pp., illus. 1934.

"The studies reported in this publication were conducted by the Intermountain Forest and Range Experiment Station in cooperation with the Utah Experiment Station and the geology department of the Utah State Agricultural College. The purpose is to present geologic evidence of flood damage and to point out that the recent floods in northern Utah constitute abnormal run-off and accelerated erosion, thereby marking a radical change from the normal rate of gradation of the present geologic epoch and climate. Evidence also is presented tending to show that this condition can be attributed chiefly to the depletion of the plant cover on the watersheds of the drainages involved."—*Expt. Sta. Rec.* 72: 541. 1935.

- _____, (2060)
SHACKLING THE MOUNTAIN FLOOD. *Amer. Forests* 41: 101-104, 150, illus. March 1935.

The trenching of slopes, building of gully dams, and planting of vegetation on the steep sides of the Wasatch Mountains in Utah by the C. C. C. is described.

- BARNES, W. C. (2061)
STORY OF MANTI; A STUDY IN CAUSE AND EFFECT. *Amer. Forestry* 16: 532-534, illus. September 1910.

The history of pioneer Mormons who staked out 6,000 acres of land in Utah which they named Manti. "Then came the herds of sheep and cattle, and the hills were swept bare. Then followed the floods. They asked the government to set aside the mountains about them for a national forest . . . This was carried out and the results were marvelous. There are some who will affect to scoff at these facts, but if they will go to Manti and study them they will find it hard work to convince those Manti farmers that the removal of the protective soil cover on their watershed had nothing to do with the floods."

BARROWS, H. H.

(2062)

AFTER THE FLOODS. Amer. Forests 42: 447-448, 484-485. October 1936.

The writer contends that existing knowledge is not sufficient to hold either deforestation or soil erosion primarily responsible for major floods. "The prevention of floods in most drainage areas appears to be impossible by any means, for men cannot control precipitation . . . a coordinated, unified national water policy is needed, not an unrelated flood policy, not a collection of unrelated policies applicable respectively to individual types of problems associated with the control and use of water." The Flood Control Act approved June 22, 1936, is criticized.

BATES, C. G.

(2063)

CHAINING THE FATHER OF WATERS. Amer. Forests 37: 66-70, illus. February 1931.

"Is the far-flung effort to chain the mighty Mississippi to its channel floor 'just one more mistake of a blundering, destructive civilization?' In seeking an answer to this question, the author, who has spent over 20 years in studying stream and soil erosion influences, 'asked the streams' that feed the great river. From their testimony he has written this article—a challenge to the present program of spending millions for flood control and nothing for flood prevention."—Editor.

(2064)

CONTROLLING MAD WATERS. Amer. Forests 43: 278-281, 300, 321-322, illus. June 1937.

"In planning flood control it behooves the nation to make use of protection forests where their value is most positive, which is in regions of considerable relief, with heavy soils of great depth or those which overlie formations of sedimentary origin in some degree water-bearing. This can be done on a large scale in the Mississippi Valley without disturbing the economy of agriculture. In all cases forests have some value in protecting soil surfaces, but in many cases the storage capacity for excessive amounts of rainfall does not exist. It is believed these later cases explain the contention of engineers that in great floods the forests have no effect, but they do not justify any such absolute statement."

(2065)

BEMAN, L. T.

FLOOD CONTROL. 162 pp. New York, H. W. Wilson Co. 1928.

The author takes the view that flood control is largely a problem of engineering rather than one of reforestation.

(2066)

BENNETT, H. H.

CONSERVATION FARMING PRACTICES AND FLOOD CONTROL. U. S. Dept. Agr. Misc. Pub. 253, 16 pp., illus. 1936.

"Conservation farming practices developed primarily for the prevention and control of soil erosion have given positive indications of wider usefulness. By slowing down the run-off of rain water in order to curb erosion, the farmer automatically reduces the volume and velocity of water which might otherwise contribute to floods." Protective soil-building crop rotations, contour strip cropping and tillage, terraces, check dams, and grassed waterways are advocated.

(2067)

RELATION OF SOIL EROSION TO FLOOD CONTROL AND SILTING. U. S. Soil Conserv. Serv. 11 pp. 1937. [Mimeographed.]

An address before the National Rivers and Harbors Congress, Washington, D. C., April 26, 1937. The author observes that the Omnibus Flood Control Act of 1936 ". . . has paved the way for a scientifically sound and thoroughly practical flood-control program encompassing not only the construction of levees, dams and other defenses along our major streams but also preventive treatment on lands whence flood waters come." The program under the act is described, and a general discussion of flood causes, their relation to soil conservation, and the effects of sedimentation are discussed.

(2068)

SOIL CONSERVATION AND FLOOD CONTROL. U. S. Soil Conserv. Serv. SCS-MP-11, 14 pp. 1936. [Mimeographed.]

An address given before the Connecticut Engineering Congress, Bridgeport, Conn., July 25, 1936. The author states that erosion control and

upstream flood control are practically synonymous and gives reasons. Research work on rainfall measurements at various experiment stations is discussed. The author also shows that the Flood Control Act recognizes the necessity of the cooperative efforts of soil-conservation programs.

BENNETT, H. H. (2069)

TALKS ON FLOOD CONTROL. *Soil Conserv.* 2: 2-6, illus. July 1936.

The author maintains that the most effective form of flood levee is a blotterlike vegetative covering of farm lands. "Vegetation retards run-off water, binds the soil in place against the wash of rain and the drifting of wind, and preserves the top layer of productive and absorbent soil."

BLAKE, E. E. (2070)

FLOOD CONTROL. *Municipal and County Engin.* 72: 297-304. June 1927.

The author discusses a study by the Interstate Commission, covering nine States on flood problems of the Arkansas and Red River Basins. "We found levees not practicable and that river straightening was a criminal error. It therefore became a matter of cutting down flood flow instead of fighting its apex." The organization and financial schemes are outlined.

BOCK, C. A. (2071)

REDUCING THE FLOOD MENACE BY PREVENTIVE ACTION. *Engin. News-Rec.* 108: 722-723. May 19, 1932.

Recommendation is made to prevent the creation or growth of flood dangers by local action directed by a State water-resources board. "Steps can be taken at little or no cost to check the growth of hazards—publicity, administrative control and long-range planning are essential elements."

BRANDENBURG, F. H. (2072)

FLOOD IN THE COLORADO. *U. S. Monthly Weather Rev.* 40: 917-918. 1912.

Account of high water in several of the important tributaries of the Colorado River in June 1912. "The damage done was principally to bridges, roads, headgates of ditches, and by erosion, and in the aggregate it was considerable."

(2073)

THE FLOOD IN THE RIO GRANDE. *U. S. Monthly Weather Rev.* 39: 1562. October 1911.

On October 4 and 5, 1911, torrential rains caused a severe flood in the upper reaches of the Rio Grande. Rainfall observations at Wagon Wheel Gap Experiment Station are given, as well as data concerning the damage done.

BROSSMANN, CHARLES. (2074)

FLOOD PROTECTION IN THE OHIO VALLEY. *Jour. Amer. Waterworks Assoc.* 29: 597-606, illus. May 1937.

"In general the problem seems to resolve itself into three main phases: to hold the water back in the upper reaches of the watershed; to get it away as rapidly as possible in the lower streams; and building levees or retaining walls for the protection of cities to the compromise height made necessary by this work." Presented before the Indiana section, American Waterworks Association, March 1937. Not examined.

BROWN, C. H. (2075)

A NATIONAL WATER POLICY IN THE MAKING. *Engin. News-Rec.* 113: 393-396, illus. September 27, 1934.

Discusses problems involved in a study of American water resources as revealed by a review of the early work of the Mississippi Valley Committee, and policies formulated for flood-control projects to be financed in part by the Public Works Administration.

BROWN, J. C. (2076)

REBOISEMENT IN FRANCE: OR, RECORDS OF THE REPLANTING OF THE ALPS, THE CEVENNES AND THE PYRANEEES WITH TREES, HERBAGE AND BUSH, WITH A VIEW TO ARRESTING AND PREVENTING THE DESTRUCTIVE CONSEQUENCES AND EFFECTS OF TORRENTS. 351 pp. (2d issue). London, C. Kegan Paul & Co. 1880.

"In the Preface is stated the exigence existing in the Cape of Good Hope and by inference existing elsewhere, for the adoption of measures similar

to what have been adopted in France to avert the destructive effects of floods and inundations." Part I is a résumé of Surell's study of Alpine torrents in which are discussed remedial measures taken by the Government of France to prevent the destructive consequences of torrents. In conclusion there is given an account of the inundation of Toulouse (p. 329) and of Hankey (p. 337), and Port Elizabeth in South Africa, as illustrative of a phase of torrents, common to many lands, which afforestation may meet. The author contends that conservation and the extension of forests, coppice woods, shrubbery, and herbage will be beneficial and profitable.

BROWN, LYLE.

(2077)

FLOOD CONTROL WORK ON THE MISSISSIPPI. Sci. Monthly 30: 481-499, illus. June 1930.

This article discusses three phases of the work—economical bank protection to stabilize the levee system and improve the channel conditions for navigation, storage reservoirs, and increased channel capacity by the elimination of bends.

CHAPMAN, H. H.

(2078)

SOUTHERN FLOODS AND THEIR FORESTRY LESSONS. Amer. Forestry 22: 476-478, illus. August 1916.

Floods in western North Carolina with consequent landslides and destruction of croplands, buildings, and bridges are described. Fire prevention and the rehabilitation of forest cover are urged as the means of saving the river valleys from utter destruction.

CHIERA, ALBERT.

(2079)

FLOOD CONTROL WORK IN ITALY. Soil Conserv. 1: 15, illus. May 1936.

Describes a supplementary control method by catch basins but observes that Italian engineers are chiefly relying on the reforestation of denuded mountain slopes for a solution.

CHITTENDEN, H. M.

(2080)

FLOOD CONTROLS WITH PARTICULAR REFERENCE TO CONDITIONS IN THE UNITED STATES. Internatl. Engin. Cong. Waterways and Irrigation Trans. 1915: 110-253, illus. 1916.

Describes the origin of floods, run-off, vegetable cover, forests, stream channels, forecasts, prevention, protection, and notable flood problems of the United States taking in the following localities: Pittsburgh, Dayton, Columbus, eastern Washington, and Colorado. A discussion is given, pages 201-253.

(2081)

FORESTS AND FLOODS. Engin. News 60: 467-471. October 29, 1908.

Extracts from an Austrian report on floods on the Danube with applications to American conditions. A chronological record of Danube floods and their causes is given.

CLAXTON, P.

(2082)

CHANNEL REGULATION FOR THE MISSISSIPPI; DISCUSSION OF BED LOAD, BANK EROSION, CUTOFFS AND BRANCH CLOSURE AS INVOLVED IN THE NEW PLANS FOR MISSISSIPPI FLOOD CONTROL. Engin. News-Rec. 111: 584-585. November 16, 1933.

"The new plan for stabilizing the Mississippi River as summarized in Engineering News-Record, June 22, 1933, suggests a number of considerations developed by experience on the rivers of India. A statement of the investigations and conclusions of the river engineers as presented in the article referred to are summarized here." Discusses bed loads, bank erosion, and cut-off problems.

COLLINS, R. F., AND SCHALK, MARSHALL.

(2083)

TORRENTIAL FLOOD EROSION IN THE CONNECTICUT VALLEY, MARCH 1936. Amer. Jour. Sci. (5) 34: 293-307, illus. October 1937.

"During the week beginning Wednesday, March 18, 1936, the Connecticut valley experienced the worst flood in its recorded history. Land damage was general throughout the valley and unusually severe in many sharply limited localities. One such locality, in the town of Hatfield on the west

bank of Connecticut River five miles northeast of Northampton, Mass., suffered such extreme and unusual erosion that the phenomenon merits brief description."

COOKE, M. L. (2084)

UPSTREAM. Survey Graphic 25: 300. May 1936.

A discussion of flood conditions in the United States. Suggests that, for proper flood control, drainage basins must be considered as a whole and erosion must be checked from the ridges downward across the slopes of the valleys.

(2085)

WE CAN REDUCE FLOOD DESTRUCTION. Birdlore 39: 101-106, illus. March-April 1937.

The author contends that "in order to minimize floods, and at the same time receive the maximum benefits from our water resources, it is essential that we hold as much water as possible on the land where it falls and, by various practices, promote its infiltration to ground-water storage." Also recommends surface storage by means of farm ponds, reservoirs, etc.

CROFT, A. R. (2086)

WHY ALL THESE FLOODS? Utah Farmer 57: 3, 11, illus. October 25, 1936.

The author presents a study of 1936 floods and reports as to their causes and effects. A considerable portion of the article includes his field notes regarding rainfall and its action. "The most effective preventative measures are those directed at preventing flood water from accumulation by restoring plant cover on the critical areas or by using mechanical devices in headwaters until an adequate plant cover can be established."

CROMIE, G. A. (2087)

PRIMEVAL FLOOD CONTROL. Forests and Outdoors 33: 181-182. June 1937.

In a letter to the editor the author encourages the reintroduction of the beaver on an extensive scale because of its importance in dam building and flood control.

CULBERTSON, G. (2088)

THE FLOOD OF MARCH 1913 ALONG THE OHIO RIVER AND ITS TRIBUTARIES IN SOUTHEASTERN INDIANA. Ind. Acad. Sci. Proc. 1913: 57-61, illus. 1914.

A short description of the flood and damage caused by it to cultivated land. "Two or three excessive rainfalls of this period added greatly to the destructive erosion of the steep hillsides, where unprotected by forest growth or other vegetation." The lesson taught by the excessive rainfall is that adequate protection against disastrous soil loss lies in reafforestation on steep slopes.

CURRIE, J. H. (2089)

PROGRESS OF THE WATER PLAN. Pacific Rural Press 131: 345. March 14, 1936.

The author discusses progress of the central valley water plan for constructing dams in the Sacramento River and various other locations in the San Joaquin Valley for redistribution of water and control of floods.

DAVIS, R. H. (2090)

WATERSHED TREATMENTS AND FLOOD CONTROL. Soil Conserv. 2: 247-250, illus. May 1937.

"We must not overlook the fact that floods occurred before settlement and use of the land. Therefore downstream installations have a very definite function and must be permanently depended upon as an important phase of flood control work."

DEBERARD, W. W., and RICHARDSON, H. W. (2091)

FLOODS BREAK ALL RECORDS IN LOWER OHIO VALLEY. Engin. News-Rec. 118: 142-143. January 28, 1937.

The authors, on a tour of the flood areas, record the approaching flood of January 1937 and give data relative to flood stages and river discharges.

DICK, W. H. (2092)

FLOOD CONTROL IS IMPERATIVE. Prog. Farmer (Miss. Valley Ed.) 52: 24. February 1937.

The author believes there is but one practical, workable plan that will solve the water problem. Among the points involved are: "Withholding

water in reservoirs before it assumes flood proportions; impounding water in reservoirs for irrigation and for the making of uniform flow in the streams, thus raising the water table in the land which will solve the water supply problem, the sewerage disposal problem and the drought problem so far as it can be solved for cultivated lands; construction of dams for the navigation of streams wherever practicable; preventing the quick run-off of water from the land, which will to a large extent prevent erosion, and the restoration of forests by reforestation."

DONALDSON, R. W.

(2093)

DAMAGE TO FLOOD LANDS. New England Homestead 109: 2. May 23, 1936.

The area in Hampshire County, Mass., which suffered most from flood waters, has been mapped in detail showing the nature and extent of damage done. "The remarkable way in which soil was saved from erosion by fields in sod or protected by roots of cover crops planted late in the summer, in contrast to tilled land left unprotected, is sufficient evidence to warrant more farmers adopting this policy in the future."

EATON, A. C.

(2094)

STORAGE BASINS AS A MEANS OF FLOOD CONTROL. Jour. Forestry 28: 3-7. January 1930.

In searching for causes of floods the author says: "The forester may blame the cutting of our timber for floods, and doubtless the cutting and burning of large tracts does affect the distribution of the run-off to the streams but it is questionable how much the forests affect the peak of a flood caused by a really big rain." Detention reservoirs and storage basins of New England are discussed. Dredging of channels, building of jetties, dikes, levees, bank protection, and other forms of improvement are admitted to have been effective to a certain point "But complete flood control of the Mississippi River is too much in the luxury class even if physically possible. Each flood control problem is a specific problem and must be analyzed carefully to obtain the correct balance between flood occurrence, stream control, storage values, channel improvements, and property damages."

EATON, E. C.

(2095)

FLOOD AND EROSION CONTROL PROBLEMS AND THEIR SOLUTION. Amer. Soc. Civ. Engin. Proc. 61: 1021-1049, illus. September 1935.

"The flood and erosion control problem treated in this paper occur in highly developed areas where there is a relatively low seasonal run-off; these areas, however, are subject to brief, although violent, torrential storms, that result in floods of exceptionally high intensity. When fires denude the sparse vegetation from steep mountain slopes the flood intensities increase and added debris hazards occur, due to erosion. Basic precipitation and run-off records are given in this paper, as are engineering methods of constructing hydrographs of expected floods, and the regulation needed for control. Similarly, measurements of erosion quantities are presented with suggested solutions of control and a method of avoiding unnecessary capital expenditures in advance of requirements. The incidental conservation of flood waters for domestic use and for irrigation is discussed."

Discussions of this paper are given by the following: A. G. Pickett and R. W. Davenport, 61 (9): 1413-1417, November 1935; C. S. Jarvis, 61 (10): 1520-1522, December 1935; H. F. Blaney, W. P. Rowe, and J. B. Lippincott, 62 (2): 244-257, February 1936; E. I. Kotok and C. J. Kraebel, 62 (3): 423-428, March 1936; D. M. Baker and E. C. Eaton, 62 (5): 740-746, May 1936.

"In the discussion by Kotok and Kraebel, pp. 423-428, data are given on run-off from large unburned watersheds in California as well as erosion rates and run-off in chaparral watersheds 1934-35. It is stated that "as a means of reducing sheet erosion from burned watersheds, the Forest Service has adopted from agriculture the idea of sowing a quick cover crop and has found the lowly mustard to be the plant best suited to the purpose."

(2096)

FLOOD AND EROSION CONTROL PROBLEMS AND THEIR SOLUTION. Amer. Soc. Civ. Engin. Proc. 62 (Paper 1950): 1302-1362. October 1936.

Discussion by A. G. Pickett, R. W. Davenport, C. S. Jarvis, F. Blaney, W. P. Rowe, J. B. Lippincott, E. I. Kotok and C. J. Kraebel, and D. M.

Baker. Territory referred to is Los Angeles County, Calif. "Basic precipitation and run-off records are given in this paper, as are engineering methods of constructing hydrographs of expected floods, and the regulation needed for control. Similarly, measurements of erosion quantities are presented with suggested solutions of control and a method of avoiding unnecessary capital expenditures in advance of requirements. The incidental conservation of flood waters for domestic use and for irrigation is discussed."

ECOLOGICAL SOCIETY OF AMERICA.

(2097)

SCIENTIFIC ASPECTS OF FLOOD CONTROL. Sci. Press v. 84, No. 3, 47 pp., illus. 1936.

This symposium consists of articles on Forest and Flood Control, by F. A. Silcox; Agricultural Land Use and Flood Control, by W. C. Lowdermilk. On the Relation of Engineering Science to Flood Control, by M. L. Cooke; with an introduction, The Scientific Aspects of Flood Control, by W. S. Cooper.

EDDY, H. P.

(2098)

NEW ENGLAND FLOODS OF 1936. Civ. Engin. 6: 301-305. May 1936.

Presents data gathered from two major floods occurring in March 1936. "They show severe rainfall augmented by heavy snow run-off, aggregating unprecedented amounts, with resulting tremendous flood flows and heights that dwarf any previous known record for this section."—Editor's note.

EDMONDS, J. E.

(2099)

MAKING THE BIG VALLEY SAFE. Country Gent. 93: 3-5, 99, illus. September 1928.

The objectives of the Flood Control Act are defined, and two major flood-control plans are described. Reforestation is considered as an important control factor.

EDMONDS, R. W.

(2100)

TO SAVE THE MISSISSIPPI VALLEY WE MUST SAVE THE TRIBUTARIES. Manfrs. Rec. 92: 63-70, illus. August 4, 1927.

"Most of the discussion of flood prevention on the Mississippi overlooks one of the most important factors in the situation . . . hundreds of millions in damage are done by these flood waters on the tributaries of their origin, frequently several hundreds of miles from the Mississippi River, and no flood-control program will be complete that ignores this fact." The writer presents a comprehensive survey of these tributary rivers and says that their valleys, like that of the Mississippi, need flood protection.

EIFERT, C. H.

(2101)

MISSISSIPPI FLOOD CONTROL. Amer. Soc. Civ. Engin. Proc. 54: 1266-1270, illus. 1928.

Discussion and calculation of the net effect of forest litter on run-off in the Ohio Basin during flood stage. "The writer wishes to emphasize the matter of the water content of the soil or its absorptive capacity by an illustration from the Miami Valley." The relative run-off of two storms is described and discussed.

ELAM, W. E.

(2102)

FLOOD CONTROL THROUGH SLOPE CORRECTION. Engin. News-Rec. 100: 996-1001, illus. June 28, 1928.

The author discusses the principle of uniform discharge through uniform slope and channel width applied to the Mississippi and states that control may be attained through revetment, levees, delta reservoirs, and possibly channel shortening.

ETCHEVERRY, B. A.

(2103)

LAND DRAINAGE AND FLOOD PROTECTION. 315 pp. New York, McGraw-Hill Book Co. 1931.

"This work deals with the surface drainage and underdrainage of agricultural land, affected by excessive water due to precipitation or irrigation; the protection of lands against flood and tide waters; and the methods of spreading assessments for the apportionment of the cost of the several classes of improvements to the areas benefited. It emphasizes fundamental theories

and principles of design and, though intended primarily as a textbook for a college course in drainage, it has been planned to be useful to engineers interested in land drainage and the protection of overflow lands."

FASSIG, P.

(2104)

ENCROACHING ON OUR STREAMS. Ohio Farmer 137: 400. March 11, 1916.

"Much of the flood damage done in the Pittsburgh district is traceable to the filling placed over the river banks in and near Pittsburgh . . . What would appear too small for a self-respecting citizen, is indulged in by our large corporations and railroads." Facts as to the contraction of river channels through the encroaching on rivers and streams, and the need for a reasonable drainage basin for every locality are stressed. Land thefts should be stopped.

FOLLANSBEE, R., AND HODGES, P. V.

(2105)

SOME FLOODS IN THE ROCKY MOUNTAIN REGION. U. S. Geol. Survey Water-Supply Paper 520-G: 105-125, illus. 1925.

"In 1923 severe floods occurred on the larger streams in Wyoming and a number of cloudburst floods on small streams in Wyoming and especially in Colorado. An investigation of the principal floods in each State was made, and the results are given in this paper, together with descriptions of two Colorado floods of 1922. In addition a study was made of all cloudburst floods to determine the areas chiefly subject to them."

FOSTER, E. E.

(2106)

DATA REQUIRED FOR FLOOD PREDICTION. Engin. News-Rec. 118: 103. January 21, 1937.

The belief is expressed that "in order to predict the spring flood or its possibilities, accurate information must be had of the snow cover on the watershed. This information must be obtained by snow surveys throughout the winter and should consist of data on the depth of snow cover and the water content. The winter temperatures and the depth of snow will reveal the capacity of the snow to hold water and the water content will indicate the quantity of runoff to be expected."

FRANKENFIELD, H. C.

(2107)

FLOODS AND THE FARMER. U. S. Dept. Agr. Yearbook 1926: 368-369, illus. 1927.

Statistics on loss to farmers from floods during the 15 years preceding 1926 are presented.

FLOODS OF 1927 IN MISSISSIPPI VALLEY COST FARMERS MILLIONS. U. S. Dept. Agr. Yearbook 1927: 317-320, illus. 1928.

Flood losses of 1927 to farmers and planters and the causes are discussed.

FREEMAN, J. R.

(2109)

FLOOD PROBLEMS IN CHINA. Amer. Soc. Civ. Engin. Proc. 48: 1113-1167, illus. May 1922.

The author discusses the concentration of floods, reforestation, river training for flood control, and ancient Chinese flood protection. The problems of the Yellow River delta are discussed with special reference to some noteworthy outbreaks of this river, characteristics of its silt, and a possible method of river training. The flood problems of the Yang-Tze and Huai Rivers are dealt with at some length, and the development and work of the Chihli River improvement commission is described. Accompanied by numerous diagrams and maps.

FLOOD STUDY AND FLOOD PRECAUTIONS. Engin. News-Rec. 99: 810-811. November 17, 1927.

In this letter to the editor, a description of a flood-protection dike for Westfield, Mass., and its durability under recent flood conditions are discussed. The need of a flood survey of the dams and water channels of Rhode Island is stressed.

- FREUDENTHAL, L. E. (2111)
FLOOD AND EROSION CONTROL AS POSSIBLE UNEMPLOYMENT RELIEF MEASURES.
Science 78: 445-449. November 17, 1933.
"Floods and erosion will continue unless the lands are reclothed in permanent vegetation . . . so that the soil will be held in place, absorption increased, and run-off from the slopes slowed down." The writer cites the primary requirements for a Federal unemployment relief program and discusses flood- and erosion-control measures particularly adapted to south-western conditions. He makes various suggestions for lines of work to be followed in such a relief program.
- FULLER, G. L., and EAKIN, H. M. (2112)
ARREST AND PREVENTION OF DEVASTATION BY FLOODS. U. S. Soil Conserv. Serv. SCS-MP-12, 11 pp. August 1936. [Mimeographed.]
The authors discuss the origin of floods and various control methods. A summarized table of the acreage and proportionate extent of general types of erosion by land-use classes for the Salt Creek project in Ohio is given, page 8.
- GAPEN, C. E. (2113)
PROTECTED WATERSHEDS REDUCE FLOODS. Agr. Leaders' Digest 17: 14, illus. July 1936.
Discusses forest soil and stream flow in relation to flood control. "Constant protection of the watersheds against fires and depletion will perpetuate our superb mountain waterways and provide a large measure of insurance against destructive floods." The importance of forest floor, deep with spongy soil, is pointed out.
- GENUNG, A. B. (2114)
THE PROBLEM OF REHABILITATION AFTER THE FLOOD. U. S. Bur. Agr. Econ. Agr. Situation 21: 14-15. April 1937.
"The problem of rehabilitation so far as the farmers are concerned has an urgency that cannot be overemphasized." The writer observes that "the damage to land by the flood is a relatively small item . . . In the main the tillable land is unhurt. There is a universal deposit of silt which may do more good than harm. There is comparatively little evidence of washing . . . By far the largest items of damage are in buildings, furniture, and feed . . . The next largest [are] livestock fences and equipment."
- GRAY, C. H. (2115)
NATIONAL FLOOD CONTROL POLICY IS NEEDED. Bur. Farmer 3: 9, 37-38, illus. October 1927.
Levee construction along the Mississippi River is the first requisite of a sound and effective national flood-control program, with secondary lines of levees having large drainage ditches. "The question of forest preservation and reforestation enters into flood control discussions . . . as forests prevent erosion, and thereby aid very materially in eliminating sand bars and other obstructions which block the channel of the rivers below . . ."
- GRAY, G. H. (2116)
FORESTS, FLOOD AND DROUGHT. Conn. Woodlands 2: 15. February 1937.
On pages 3-5 the Connecticut Valley flood of 1936 is discussed and control measures outlined for reducing the height of floods: "(a) Those upstream, the effect of which is to retard the run-off of precipitation on the watershed. (b) Those downstream from the point of flooding to the ocean, whose object is to keep the channel clear of obstructions and assure the most rapid outlet for the flood waters."
- GREGG, W. R. (2117)
FORECASTING FLOODFLOWS. Engin. News-Rec. 118: 198-199, illus. February 4, 1937.
The writer believes that the United States Weather Bureau can be of help where the run-off from a large area is concerned, but that much remains to be learned before the small storm of intense precipitation can be forecast. Experience of the Weather Bureau shows that it is possible to fore-

cast the amount of flood flow in large rivers with reasonable accuracy but that it is not yet possible to predict where unusual concentration of the precipitation will occur or what the total precipitation will be.

GRUNSKY, C. E.

(2118)

SOME FACTORS AFFECTING THE PROBLEM OF FLOOD CONTROL. Amer. Soc. Civ-Engin. Trans. 85 (Paper 1505) : 1383-1562, illus. 1922.

Articles included are: Flood Control in Canada, by J. G. Sullivan; Floods on Small Streams Caused by Rainfall of the Cloudburst Type, by G. H. Matthes; Standing Waves in Rivers, by N. C. Grover; Flood Problems in China, by J. R. Freeman, also in Proceedings (2109); Flood Control of the Mississippi River, by J. A. Ockerson; Missouri River Bank Protection at Omaha, Nebr., by R. N. Towl; Flood Problems in the Arid Region, by A. P. Davis; Flood Control in the Miami Valley, Ohio, by C. H. Paul. Included are discussions by M. Knowles, H. P. Eddy, J. A. Holmes, D. W. Mead, A. O. Ridgway, J. B. Challies, G. M. Lehman, W. H. Breithaupt, A. F. Meyer, J. Millis, C. McD. Townsend, T. H. Wiggin, and E. W. Lane.

GUFFEY, JOSEPH F.

(2119)

AVERTING THE FLOOD PERIL. Cong. Rec. v. 80: 4643-4645. March 31, 1936.

Senator Guffey, of Pennsylvania, in a radio address, said: "Unless we control floods, and control soil erosion at the same time, the Nation faces physical and social bankruptcy." He referred to the work of the T. V. A. and to the flood control program of the Administration, the Soil Conservation Service, and the effectiveness of the measures taken by the Department of Agriculture and other agencies.

HALL, W. L., AND MAXWELL, HU.

(2120)

SURFACE CONDITIONS AND STREAM FLOW. U. S. Forest Serv. Cir. 176, 16 pp. 1910.

The writers discuss the tendency toward increased floods, and the cause of increased flood conditions: precipitation, evaporation, temperature, topography and geology, natural and artificial reservoirs, soil, ground cover, and a comparative study of watershed conditions.

HARMON, JAMES.

(2121)

FLOOD CONTROL. Communist 16: 569-576. June 1937.

Marxian dialectical materialism as applied to flood control and soil conservation. Deposits that modern American capitalism is responsible for floods and erosion, "... the plunder of the natural resources of the country by the ruling class" States that the programs of the Soil Conservation Service and the Tennessee Valley Authority are ineffective. Proposes no specific control measures other than the election of "... powerful progressive legislative blocs or a Farmer-Labor Party that would enact the necessary legislation and safeguards which would enable the toilers and the technicians to carry to fruition their programs against the wishes of the all-powerful industrial masters of the great utilities and mass production industry trusts."

HARRIS, W. H.

(2122)

THE MAY FLOOD (1901) IN THE SOUTHERN APPALACHIAN REGION THE CATAWBA RIVER VALLEY, N. C. Forestry and Irrig. 8 (3) 105-109 illus. 1902.

The change in characteristics of the Catawba River floods is pointed out compared with those of earlier times. "The whole secret of the bad effects and extent of the flood lies in the deforestation in the western part of the State. The establishment by the National Government of forest reservations appears to be the only solution."

HATT, W. K.

(2123)

FLOOD PROTECTION IN INDIANA. Ind. Bur. Legis. Inform. Bull. 4, 51 pp., illus. 1914.

"This report contains a full presentation of the history of floods in Indiana, a summary of the causes of floods, a collection of available data of rainfall, river discharge and topography, a discussion of flood protection works and a discussion of the principles of legislation to provide for flood relief."—Foreword.

HAZEN, A. (2124)

FLOOD FLOWS. 199 pp., illus. New York, John Wiley & Sons; London, Chapman & Hall. 1930.

A study of flood frequencies and magnitudes is presented. "Study of floods and flood flows brings home the fact that there is no such thing as a maximum flood. Instead there is a succession of floods of ever-varying sizes." In conclusion the author states: "The surprising thing is that each time a flood occurs so many intelligent people take it as an act of God rather than something that grew out of their own acts (or perhaps of their fathers') and fail to see that it could have been anticipated and much of the damage prevented . . ." Possible flood insurance is discussed.

[HERBERT, P. A.] (2125)

MORE FLOODS IF ENGINEERS DOMINATE FUTURE CONTROL POLICIES. Forestry News Digest, p. 1. March 1937.

The major problem "can only be solved by erosion experts, foresters, and land economists. Billions of dollars have been spent in this country for flood control and flood relief but still our floods are becoming more frequent and more destructive. Clearly, there is something wrong with our control efforts."

HIBBS, B. (2126)

WATER TO THE SEA. Country Gent. 107: 7-8, 69-71, illus. June 1937.

The author surveys the disastrous Mississippi floods from the geological viewpoint and takes issue against the general belief that floods are largely man-made. The history is sketched of the Mississippi and other rivers of the central part of the continent which "created all the land which is now Louisiana, most of the States of Arkansas and Mississippi and parts of Missouri, Kentucky, Tennessee, and East Texas . . . To advocate erosion control and reforestation as correlated palliatives in flood control can do no harm; to offer them in lieu of genuine protective engineering as is sometimes done is dangerous nonsense."

HILLMAN, E. C. (2127)

THE EFFECT OF FLOOD-RELIEF WORKS ON FLOOD-LEVELS BELOW SUCH WORKS. Jour. Inst. Civil Engin. 1935-36 (6): 393-440. April 1936. (Paper 5043).

In this paper are given the results of studies to determine the extent of alterations on unprotected flood-level areas due to the elimination of flooding by channel improvement or bypassing, with the object of reducing flood levels locally, and embankment systems with the object of excluding flood waters from certain areas. The author's conclusion states that "it has been shown (1) That the effect of by-passing on flood-levels below the by-pass is nil; (2) That the effects of eliminating storage-capacity depends upon:—(a) The size of the storage-reservoir in relation to the flow in the river; (b) The shape of the flood-hydrograph. In general, the effects will consist of an acceleration of the 'flood-wave', and a slight increase of the peak flood-level in the river below the area from which floods have been excluded . . ." A discussion of the paper is included.

HOLMES, J. A. (2128)

MAKING RAPID FIELD EXAMINATIONS OF FLOOD CONTROL RESERVOIR SITES; METHODS USED TO SECURE PHYSICAL AND ECONOMIC DATA ON FOURTEEN DAMS AND SIX RIVER SYSTEMS IN THE MISSISSIPPI VALLEY. Engin. News-Rec. 106: 386-388, illus. March 5, 1931.

"One of the tasks which faced the Mississippi River commission in its flood-control study of the lower Mississippi Valley was the determination of the effect of retention reservoirs on floods, both local and general. Although conducted primarily for flood-control purposes, the study also touched incidentally upon the improvement of navigation, irrigation, and drainage conditions." The results of findings are discussed.

HOYT, J. C. (2129)

DROUGHTS AND FLOODS. Engin. News Rec. 118: 196-197, illus. February 4, 1937.

Abnormal weather conditions during the past year were reflected in unprecedented floods and a repetition of severe droughts. Average flow of streams was normal, but ground-water levels were generally lower in the

West, but without water shortage in storage reservoirs. An estimate of flood flows of 1936 in the northeastern part of the United States is given by means of tables. The author states that "large portions of the drainage area in which the floods occurred were well protected with vegetation in the form of forest and brush lands. The floods persisted, however, on these as well as on barren and agricultural areas. With the large quantity of water available for run-off it is difficult to see that changes in forest or vegetative covering since pioneer days were responsible for 1936 floods exceeding those which had previously occurred."

IVES, R. L. (2130)
DESERT FLOODS IN THE SONOYTA VALLEY. Amer. Jour. Sci. (5) 32: 349-360.
November 1936.

Observations of three major types of floods—sheet floods, stream floods, and playa floods—are presented. "Any or all of these may result from a single downpour, the type of flood being determined by the type of precipitation, the topography on which it falls, and the amount of precipitation on a given area in a given time. Definite storm paths were observed, and local convection currents, confined to the valley, or a part of it, were noted as important factors in secondary storms."

JACOBS, JOSEPH. (2131)
FLOOD CONTROL POLICY. Engin. News-Rec. 117: 131. July 23, 1936.

Suggests extensive flood-control surveys and investigations to be used in formulating a definite plan of procedure involving a payment plan whereby local, State, and Federal interests may be assessed on the basis of benefits conferred.

JACUA, J. H. (2132)
FLOODS IN THE PASCAGOULA AND PEARL RIVERS DURING JANUARY AND FEBRUARY 1913. U. S. Monthly Weather Rev. 41:185-186. 1913.

Account of these floods with data as to stages predicted and stages attained.

JARVIS, C. S., AND OTHERS. (2133)
FLOODS IN THE UNITED STATES: MAGNITUDE AND FREQUENCY. U. S. Geol. Survey Water-Supply Paper 771, 497 pp., illus. 1936.

This paper consists of descriptive, general, and historical notes; methods for estimating floods; examples of procedure for analyzing flood flows; records of floods on selected rivers; a study of methods of estimating flood flows applied to the Tennessee River; the reliability of statistical methods in the determination of flood frequencies; hydrologic conditions as affecting the results of the application of methods of frequency analysis to flood records; determination of flood flow by unit-hydrograph method; bibliography relating to flood flow, intense rainfall, and frequencies. "The objective has been to review the technique and procedure of estimating expected floods and to compile, in a form suited for ready reference, flood statistics for streams where long-time records are available. The results of the study here presented are a substantial contribution to this end."

KANSAS STATE PLANNING BOARD. (2134)
WATER: ITS USE AND CONTROL IN KANSAS. Kans. State Planning Bd., 28 pp., illus. October 1936.

"Erosion by water is doing the greatest damage agriculturally in the northern and eastern parts of the State. In 40 years of cultivation, the productivity of the lands in northeast Kansas has declined more than 20%." The author states that 97 destructive floods in 90 years have brought an estimated damage of approximately \$150,000,000. Plans for flood control and drought mitigation through improved methods of water control and land use are among the points discussed in this program of water conservation.

[KELIHER, MARTIN M.] (2135)
CONSERVATION WORK TESTED IN GILMORE CREEK FLOOD. Save our Soil 1: 3.
May 1936.

Terrific rainstorm demonstrates value of S. C. S. work in preventing soil erosion. Project manager comments on storm results

- KELLER, C. (2136)
FLOOD STORAGE RESERVOIRS: THEIR EFFECT ON THE POWER INDUSTRY. Jour. Land and Public Utility Econ. 5: 1-7. February 1929.
The way in which various floods of the Mississippi River from 1912 to 1927 has influenced the construction of storage reservoirs to prevent floods is discussed. The plan of the War Department for creating a reservoir by means of a dam with large sluiceway capacity is outlined.
- KLEIN, JACK. (2137)
WATER CONSERVATION AND FLOOD CONTROL. Calif. Cult. 78: 291-303, illus. March 26, 1932.
Discusses activities of the Pomona Valley Protective Association in water conservation and flood control on projects in southern California.
- KNAPP, BRADFORD. (2138)
A BROAD VIEW OF PROTECTION AGAINST FLOODS. Successful Farming 26: 5, 47-49, illus. February 1928.
Reforestation and the retention of vegetative cover are cited as being of major importance in flood control.
- KRAEBEL, C. J. (2139)
LA CRESCENTA FLOOD. Amer. Forests 40: 251-254, illus. June 1934.
The origin of southern California's 1934 flood catastrophe is traced to pre-swept mountain slopes. Burned slopes and watersheds are illustrated.
- KUTZ, C. W. (2140)
WORK OF MISSISSIPPI RIVER COMMISSION OUTLINED: FLOOD-CONTROL PROGRAM. Engin. News-Rec. 99: 670-733. October 27, 1927.
This is an extended abstract of the work of the commission and gives the general character of the plan for improving flood conditions along the Mississippi River which the corps of engineers prepared for presentation to Congress.
- LEIGHTON, M. O. (2141)
FLOODS. U. S. Geol. Survey Water-Supply Paper 234: 10-27., illus. 1909.
Floods are increasing, judging by river-discharge records in the United States. Diagrams illustrate individual floods with annual rainfall data. A comparison between the number and depth of flood-producing rains and the number of flood days made on the Tennessee Basin above Chattanooga, pages 22-24, is discussed and illustrated by tables. Flood damage and the storage of floodwaters are discussed, pages 24-27.
- LEMKE, WILLIAM. (2142)
FLOOD CONTROL BY WATER CONSERVATION. Cong. Rec. v. 80, pp. 4420-4422. March 26, 1936.
Attention is called to H. R. 533, a bill introduced during the last session of Congress. "This bill provides for a practical solution of our ever-recurring flood problems. It at the same time conserves and makes use of the waters for the people of this Nation." Irrigation, reclamation, electric power, soil erosion, silt, climate, and employment were all considered and discussed with respect to the bill. "When this bill becomes a law there will arise a midland empire on the eastern slope of the Rocky Mountains . . . It will give a new frontier to our national aims . . . It will harness the rivers and streams at their source and use them for the good of mankind . . ."
- LOS ANGELES COUNTY BOARD OF ENGINEERS—FLOOD CONTROL. (2143)
REPORTS—TO THE BOARD OF SUPERVISORS, LOS ANGELES COUNTY, CALIF., 1915. 399 pp., illus. 1915.
A remedial program, made necessary by the destructive flood of February 1914, is suggested which must include: (1) Conservation of storm waters through reforestation and retarding work in the mountains; (2) spreading of storm waters on the gravel deposits at the mouths of the canyons; and (3) acquisition of official channels for the principal streams on the lower levels and the permanent rectification and protection of these channels. Check dams in Haines Canyon and an experimental reservoir and dam in Clearwater Canyon are described, discussed, and illustrated, pages 286-296. Comparisons with European check-dam work and technical data are discussed, pages 296-301.

- LOVE, S. K. (2144)
SOIL LOSS IN POTOMAC FLOOD. *Engin. News-Rec.* 118: 935. June 24, 1937.
Information is given with respect to the silt loads and corresponding denudation over a drainage basin resulting from the Potomac River flood of April 1937.
- LOWDERMILK, W. C. (2145)
EROSION AND FLOODS ALONG THE YELLOW RIVER WATERSHED. *Jour. Forestry* 22: 11-18. October 1924.
Flood problems of the Yellow River in North China are reviewed based on investigations undertaken at the University of Nanking. "The floods of North China are intimately related to the erosion of the extensive loess deposits. The building of dykes alone is not sufficient to bring about a lasting solution to the control of floods. Something must be done to reduce the wide spread erosion in the loess uplands along with dyke construction in the plains of deposition." Recommendations are made for planting willows, poplars, black locust, and native catalpa in the bottoms of gullies and on the talus slopes. The author concludes: "Fill the gullies with trees rather than plant the hills with trees."
- MCLoud, N. C. (2146)
HOLDING THE BANKS OF THE MISSISSIPPI. *Amer. Forestry* 29: 242-243, 249, illus. April 1923.
"Trees have come to play an important part in the protection of Mississippi River embankments from destructive erosion and the prevention of disastrous floods . . . For this use the trees are woven into mattresses of enormous proportions . . . Revetment work involves the use of the willow mats in conjunction with concrete paving . . . , this mat is known as 'the continuous woven-willow type', . . . These willows, hugging the face of the submerged embankment, have proven effective in preventing 'the undermining action of the current . . . ' The author maintains that "the clearing of the forests has materially affected the distribution of the annual rainfall of the tributary regions . . . The flood troubles of the Mississippi Valley give added force to the arguments for reforestation on a widespread scale."
- MCPHETERS, W. H. (2147)
SOIL CONSERVATION AS AN AID TO FLOOD CONTROL. *Agr. Engin.* 11: 339-341, illus. October 1930.
Floods in Oklahoma, with consequent destruction of soil, are reviewed. The author advises that "along with any land reclamation program should go a farm pond-building program . . . The argument may be advanced that after these ponds are all filled with water they will do no good." Ponds would keep immense quantities of water from reaching streams that now flood the bottom lands, destroying millions of dollars' worth of crops and property each year. An article by similar title appears in *Prof. Engin.* 16: 20-22. February 1931.
- MAITS, C. B., Jr. (2148)
MUDDY WATERS. THE DAMAGE OF FLOODS AND SOIL EROSION TO FARM LAND. *Pa. Farmer* 115 (6): 5, 21, illus. September 12, 1936.
The flood of March 1936 and the damage caused by soil loss is discussed. Measures employed by the Soil Conservation Service are cited. "Cultivating on the contour of a slope, running crops in strips between other strips of thick growing erosion-resisting grasses . . . are some of the ways that the problem of erosion is met on slopes in cultivation."
- MARTIN, ROBERT E. (2149)
ARMY RECRUITED FROM IDLE MEN WARNS AGAINST FIRE AND FLOOD. *Pop. Sci.* 125: 49-52, illus. July 1934.
Describes the work of the Civilian Conservation Corps in erosion control and other projects.
- MAXWELL, G. H. (2150)
TURN THE FLOODS INTO FORESTS. *Amer. Forests* 41: 14-16, illus. January 1935.
Shows how the conservation of flood waters in the Prairie States is essential to the full success of the shelterbelt project of land reconstruction.

- MEGINNIS, H. G. (2151)
FORESTRY INVOKED TO AID FLOOD CONTROL IN MISSISSIPPI UPLANDS. U. S. Dept. Agr. Yearbook 1931: 262-265, illus. 1931.
The part agricultural practices may have played in producing floods and the value of vegetative cover.
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- THE YAZOO FLOOD AND ITS CAUSES. Amer. Forests 38: 592-593, 623-624, illus. November 1932. (2152)
"Studies recently carried out near Holly Springs, Mississippi, by the Southern Forest Experiment Station of the U. S. Forest Service indicate that floods are due not so much to quantity of rainfall as to the type of land on which the rain falls . . . These recent studies on the uplands of the Tallahatchie watershed have special significance because they were carried out at the very time when the Tallahatchie, Coldwater, and other rivers were pouring their swollen torrents over the upper Yazoo delta in an unprecedented flood . . ." These experiments and their results are described. The author says that "in considering methods of flood prevention and control . . . the great natural reservoir, the soil, has seldom been considered."
- MORGAN, A. E. (2153)
CONTROL OF GREAT FLOODS. Engin. News-Rec. 118: 401-403, illus. March 18, 1937.
"A task of unprecedented magnitude, flood control requires that every possible method be studied, including headwater and soil control. It should be treated as part of integrated river control for all purposes."
- MORGAN, ARTHUR E. (2154)
YARDSTICK—AND WHAT ELSE? Sat. Evening Post 210: 5-7, 77-78, 80-81, illus. August 7, 1937.
The author points out that the T. V. A. program also will reduce soil erosion. He discusses the control of the Tennessee River and adjacent rivers with a series of dams, reservoirs, and lakes, and how such an enterprise will help prevent disastrous floods and aid inland navigation. He discusses fully the power problem, how and through whom it is to be distributed.
- MORRIS, SAMUEL B. (2155)
VALUE OF WATERSHED COVER IN FLOOD CONTROL. Jour. Forestry 33: 748-750. August 1935.
This paper, presented at the annual meeting of the California section of the Society of American Foresters, December 7, 1934, says in part: "I should emphasize the fact that the greatest value of watershed cover to flood control is in retention of the soil, and diminishing the rate of erosion into the streams . . ."
- MCXOM, W. J. (2156)
RIVERS AND FLOODS. U. S. Monthly Weather Rev. 64: 24-25. January 1936.
A record of rivers and floods, with tables of flood stages. "Warnings of the overflows were issued well in advance and resulted in large savings in movable property and livestock."
- MUNNS, E. N. (2157)
CONTROL OF FLOOD WATER IN SOUTHERN CALIFORNIA. Jour. Forestry 17: 423-429. April 1919.
Check dams built of stone so placed across the channel that the water collects in a basin behind the dam are advocated. Haines Canyon and the Sunland drainage basin, together with storms and floods of 1914 to 1916, are discussed.
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- EROSION AND FLOOD PROBLEMS IN CALIFORNIA. 165 pp., illus. Calif. State Bd. Forestry. Sacramento, Calif. 1923. (2158)
Report to the legislature on Senate Concurrent Resolution No. 27. This report discusses at some length the California watershed policy, which includes factors affecting and influencing stream flow and erosion, methods necessary to prevent further erosion, erosion areas and meteorological con-

ditions, erosion processes and the effect of erosion on soil, grazing and erosion, fire and erosion, hydraulic mining and smelter areas, lumbering and erosion, erosion control and plan of action necessary to prevent further erosion.

MULPHY, E. C.

(2159)

DESTRUCTIVE FLOODS IN THE UNITED STATES IN 1903. U. S. Geol. Survey Water-Supply and Irrig. Paper 96, 81 pp., illus. 1904.

"The year 1903 will long be remembered for its extreme local variations from normal climatic conditions." The Heppner, Oreg., flood, the South Carolina flood, and the early floods in the Mississippi Valley as well as those of 1903 are described and tabular data on rainfall and high water given. The Kansas floods, with hydrographic data, are discussed. Methods for preventing damage by future floods are considered with reference to surface and ground storage, artificial storage, rapid removal of water, and levees.

— AND OTHERS.

(2160)

DESTRUCTIVE FLOODS IN THE UNITED STATES IN 1905. U. S. Geol. Survey Water-Supply and Irrig. Paper 162, 105 pp., illus. 1906.

Gives flood data on the Poquonock River, Conn.; Sixmile Creek and Cayuga Inlet, N. Y.; the Unadilla and Chenango Rivers, N. Y.; the Allegheny in Pennsylvania and New York; the Ohio; Devils Creek, Iowa; Pecos River in New Mexico and Texas; the Rio Grande; and the Colorado River Basin.

MUSGRAVE, M. E.

(2161)

DISTRIBUTION AND UTILIZATION OF FLOOD WATERS ON NAVAJO LANDS. Science 82: 461-462. November 15, 1935.

The relation of the flood waters of the Navajo lands to the Boulder Dam is shown. The effects of collecting and distributing these waters are far reaching; the deposit carried by them is now being spread on adjoining lands instead of washing down into the Colorado, thus helping to preserve one of the greatest irrigation projects in the country.

NEBRASKA STATE PLANNING BOARD.

(2162)

WATER RESOURCES OF NEBRASKA. 695 pp., illus. [Lincoln.] December 1936. [Processed.]

Information is given as to geology, topography, climate, streams, surface- and ground-water utilization, irrigation, and flood problems for 11 river basins of Nebraska.

NEW HAMPSHIRE FLOOD RECONSTRUCTION COUNCIL.

(2163)

REPORT OF THE NEW HAMPSHIRE FLOOD RECONSTRUCTION COUNCIL ON THE FLOOD OF MARCH 1936. 80 pp., illus. 1936. [Processed.]

Section 1 deals with the nature and causes of flood, forestation and soil conservation being cited as major control factors; section 2, relief and public health; section 3, flood damage to industries and farms; section 4, damage to public property; section 5, Federal cooperation; section 6, public finance problems; section 7, flood-control planning; section 8, recreational service; section 9, mobilization for future disasters; section 10, the New Hampshire Flood Reconstruction Council.

OLBERG, C. R., AND SCHANCK, F. R.

(2164)

IRRIGATION AND FLOOD PROTECTION, PAPAGO INDIAN RESERVATION, ARIZONA. 62d Cong., 3d sess., S. Doc. 973, 32 pp., illus. 1913.

A special report on the cost of a proposed system of water development and a distributing system for the irrigation and protection from floods of irrigable lands on the Papago Indian Reservation in Arizona. A general description of the reservation, with a history of water development in Arizona, is followed by measures for proposed flood control. Nine exhibits accompany the report.

OOSTHUIZEN, E. A.

(2165)

SOIL EROSION.—TRAINING BANKS FOR DIVERTING FLOOD WATERS. Farming in So. Africa. 11: 99-101, illus. March 1936.

The chief causes of erosion are stated to be drought, overstocking, and tracks, and the chief promoter is water. In combating erosion careful study of the topography of the area concerned must be made, and also of the

maximum quantity of water which may be expected in times of great flood. In reasonably flat country it may be possible to control the flow of water by means of training banks, and then to distribute the water by contour-bank systems. Silt traps with spillways are considered and illustrated.

OWENS, G. T. (2166)
HAVE MISSISSIPPI FLOODS BEEN CONQUERED? Civ. Engin. 6: 431-433. July 1936.

A plan is submitted for a reservoir system in the Mississippi Valley, to retain rainfall as nearly as possible where it falls, and to permit excess rainfall to enter the Mississippi gradually in such quantities as to prevent floods in the lower basin and erosion in the entire upper valley.

PACK, F. J. (2167)
TERRITORIAL POTENTIAL OF DESERT WATERS [Utah]. Pan Amer. Geol. 40: 349-356, illus. 1923.

On August 13, 1923, several localities in northern Utah were visited by the most devastating floods known in local history. "The extreme intensity of the flood was the result largely of certain local conditions within the canyons . . . The manner in which the rock debris was transported during this phase of the flood constitutes one of the most unusual aspects of the entire period of flooding." A detailed description of the flood and its actions is presented.

PATRICK, A. L. (2168)
AGRICULTURE'S NEW APPROACH TO FLOOD CONTROL. Soil Conserv. 2: 245-246, 266. May 1937.

The Omnibus Flood Control Act (Public, 738—74th Cong.), which Congress passed on June 22, 1936, authorized a coordinated land and water program for flood control. "The act authorized \$10,000,000 to be appropriated in equal amounts by the Departments of War and Agriculture for carrying out any examinations and surveys provided for in the act."

PETTIS, C. R. (2169)
FLOOD PROBABILITY FORMULA MODIFIED TO SIMPLIFY APPLICATION. Engin. News Rec. 112: 804-805, illus. June 21, 1934.

The author discusses "a method of determining the probable 100-year floods based on the width of a drainage area and on rainfall statistics modified to improve it both practically and theoretically."

(2170)
A NEW THEORY OF RIVER FLOOD FLOW, PRESENTING A PRACTICAL FORMULA FOR COMPUTING MAXIMUM FLOOD DISCHARGE. 61 pp. 1927.

"No extravagant claim is made for the new theory set forth in this book nor for the formula based upon that theory but, within its limited scope, the formula gives results which agree so closely with the observed discharges of a large number of streams, that the author is prompted to offer it as a contribution to the pressing national problem of flood control."

(2171)
RELATION OF RAINFALL TO FLOOD RUN-OFF. Mil. Engin. 28: 94-98. March-April 1936.

A study is presented in which the relation of rainfall to flood run-off is reduced to a simple mathematical basis, so that the general principles can be understood by one who is familiar with the current literature on the subject. The probable 100-year flood, or the probable maximum discharge to be expected on the average once in each period of 100 years, is used as the basis of the discussion.

PILLSBURY, G. B. (2172)
FLOOD CONTROL BEGUN. Engin. News-Rec. 118: 192-195, illus. February 4, 1937.

Outline of scope and status of work undertaken by the corps of engineers in accordance with authorization of the Flood Control Act of 1936. It is pointed out that responsibility for making surveys and preparing plans for flood-control projects was placed upon the Army engineers for the execution of a country-wide series of projects authorized at an ultimate cost of over \$300,000,000.

PINCHOT, GIFFORD.

(2173)

FLOOD CONTROL. Conservation 3: 5-6. March-April 1937.

"Condensed from 'The Washington Post' for February 8," 1937. The time to stop a flood is before it begins. "There is no mystery about what is required. We need to stop forest devastation at the headquarters, and for that we must control the logging and the fires. We need to replant or protect the natural regrowth on lands better suited to the forest than the plow . . . We need to return many acres to soil-conserving and soil-protecting crops. We need to prevent over-grazing. We need terraces, and planting for soil protection . . . We must control and repair erosion that is already under way."

PRESIDENT'S COMMITTEE ON WATER FLOW.

(2174)

DEVELOPMENT OF THE RIVERS OF THE UNITED STATES. 73d Cong., 2d sess., House Doc. 395, 423 pp., illus. Washington, Govt. Print. Off. 1934.

"Message from the President of the United States transmitting a preliminary report on a comprehensive plan for the improvement and development of the rivers of the United States with a view of giving the Congress information for the guidance of legislation which will provide for the maximum amount of flood control, navigation, irrigation, and development of hydro-electric power." This report is divided into 10 parts: Part 2, on Organization and Policies, discusses, on pages 34-47, the soil-erosion problem and outlines the work of the Soil Erosion Service; part 3 reviews soil-erosion conditions for the Atlantic region, pages 120-126; part 4 considers erosion in the Gulf region, pages 164-172; and part 5 discusses the erosion problem in the eastern Mississippi region, pages 191-194.

PURCELL, F. X.

(2175)

MUSKINGUM RIVER FLOOD CONTROL. Mil. Engin. 28: 184-188, illus. May-June 1936.

The cause of Muskingum River floods and details of flood-control-project organization and work are given, with description of design of dams used in project.

REED, C. D.

(2176)

FLOODS OF THE UPPER MISSOURI RIVER. U. S. Monthly Weather Rev. 39: 877-879, illus. 1911.

"Little has been published on the subject of flood conditions and fluctuations of river stages in the upper Missouri River. It is therefore hoped that this short article, treating of some phases of the subject, may be interesting to those who are now trying to revive navigation . . . who are engaged in bank protection and other works of construction along the stream, and to the many farmers who venture to till the broad acres of unusually fertile land subject to occasional overflow that lie adjacent to the river through several States."

ROCKIE, W. A.

(2177)

WHAT CAUSES OUR FLOODS? Northwest Sci. 10: 2-5. November 1936.

Discusses the cooperative work of the Bureaus of Chemistry and Soils, and Agricultural Engineering, and the Forest Service in the control of soil erosion in Iowa. The author concludes that forest and soil conservation will do more to prevent floods than anything else.

RORTY, JAMES.

(2178)

FLOODS CAN BE CONTROLLED. Nation 144: 205-207. February 20, 1937.

The author went to T. V. A. headquarters at Knoxville, Tenn., to seek the answers to two questions: Is a real solution of the problem of flood control possible? How much would it cost, and would it be worth the price? Stresses need for scientific as well as engineering attack on the problem.

ROSE, M. A.

(2179)

TAMING OL' MAN RIVER. Today 6: 7-9, 18, illus. April 25, 1936.

Describes various projects in operation to control Mississippi River floods, including the spillway beginning at the mouth of the river to take excessive floods from New Orleans to Lake Ponchartrain, the Atchafalaya floodway, the projected Eudora floodway, and the Boeuf floodway project.

- ROTH, WALTER J. (2180)
WEIGHING THE COSTS OF FLOOD CONTROL. Soil Conserv. 2: 201, 207, illus.
March 1937.

"A phase of the cost of floods . . . is the loss of fertility and productive capacity because of erosion on tilled farm lands through soil removal from higher areas with subsequent redeposition on lower areas and in channels, ditches, lakes, and reservoirs." Soil- and water-conservation practices and their relative costs are reviewed by the author.

- ROTHROCK, J. T. (2181)
FLOODS, FIRES, AND FORESTS. Forest Leaves 4: 167. August 1894.

The author says in part that "it is quite within the power and knowledge of man to diminish the frequency and severity of such floods. Anything which interferes with the flow of water in the main stream, or raises the general level of that main stream is an aid in production of floods." The effect of dams and masses of logs and removal of timber from headwaters of streams are pointed out as the cause of destructive freshets.

- SACKETT, R. L. (2182)
THE WABASH RIVER FLOOD OF 1913 AT LAFAYETTE, INDIANA. Ind. Acad. Sci.
Proc. 29: 63-68, illus. October 24, 1913.

The principal factors affecting the flood discharge of rivers are discussed and various formulas proposed to express maximum flood flow, together with available data on floods in the Ohio River Valley.

- SCHULZ, E. H. (2183)
SOME HYDRAULIC PROBLEMS OF THE MISSISSIPPI RIVER. West. Soc. Engin. Jour.
33: 288-296. June 1928.

"Since the Mississippi has no natural reservoirs, it is not surprising that there should be great variations in stage and flow . . ." The history of the levee system in relation to the flood of 1927 is cited together with work and costs under Federal charge. Suggested remedies are control of drainage, contour plowing, reforestation, additional levee heights, dredging, reservoirs, storage basins, outlets, diversions, and spillways.

- SCIENCE NEWS SERVICE. (2184)
SOME PAPERS READ AT THE ROCHESTER MEETING OF THE AMERICAN ASSOCIATION
AND ASSOCIATED SOCIETIES. Science 84 (Sup.): 5-7. July 31, 1936.

Flood-control problems discussed at the summer meeting of Ecological Society of America, by scientific workers in forestry, soil conservation, and engineering. The speakers were unanimous in the opinion that flood-control problems cannot be met with engineering construction alone, but that the "ultimate effective efforts must be put forth far upstream, where the 'little waters' are . . . there man may restore and protect that vegetative cover which forms nature's own great reservoirs and settling basins, dams, revetments, and levees."

- SEARS, P. B. (2185)
HALF-HEARTED MEASURES WON'T SUCCEED FOR FLOOD CONTROL. Sci. News Letter
31: 84, illus. February 6, 1937.

"Modern civilization must design its own landscape no less than its cities if it is to survive . . . The general principles of preventing flood damage are well understood, but great need remains for fundamental studies on climate and soil, and particularly the social sciences. The problem is really one in human ecology."

- SHERMAN, C. E. (2186)
THREE OHIO CONSERVANCY PROJECTS. Ohio Engin. Expt. Sta. News 8 (2):
13-15, illus. April 1936.

The great storm of March 1913, causing rains in every State but three, is cited with description of flood-retarding measures since built in the Miami, Muskingum, and Scioto-Sandusky districts to prevent repetition of disaster.

- SILCOX, F. A. (2187)
A NEW POLICY FOR FLOOD CONTROL. Amer. Forests 43: 106-108, 146-147, illus. March 1937.

The author refers to the Omnibus Flood Control Act, approved June 22, 1936, which recognizes biological control as coordinate with engineering control of floods. The history of the Mississippi's disastrous known floods is traced back to 1542. Erosion within the Ohio watershed is discussed.

- , LOWDERMILK, W. C., AND COOKE, MORRIS L. (2188)
SCIENTIFIC ASPECTS OF FLOOD CONTROL. Amer. Assoc. Adv. Sci. Occas. Pub. 3, 47 pp., illus. October 1936.

This symposium was sponsored by the Ecological Society of America and the American Association for the Advancement of Science. It contains the following articles: Forests and Flood Control, by F. A. Silcox; Agricultural Land Use and Flood Control, by W. C. Lowdermilk; and On the Relations of Engineering Science to Flood Control, by Morris L. Cooke. The relation of erosion control to flood control is shown.

- SPENCER, J. H. (2189)
WISCONSIN RIVER FLOOD OF OCTOBER 1911. U. S. Monthly Weather Rev. 39: 1517-1519. 1911.

The causes of the flood and the damage it caused are discussed.

- STEWART, ROBERT. (2190)
SOIL WASTE AND THE FLOOD MENACE. New Repub. 53: 64-67. December 7, 1927.

The author attributes the recurrent Mississippi River floods to deforestation and soil erosion. "There is a single condition effective over the whole drainage area of the Mississippi which is vitally different now from what existed 125 years ago, and is fundamentally the basic cause contributing to the flood situation on the Mississippi River today. Land in the Mississippi drainage area is now largely under cultivation, whereas then it was under sod. For example, in Iowa and Illinois, 85 percent of the entire area is now improved farm land. As a result, soil erosion is taking place at an alarming rate . . ."

- STRONG, P. N. (2191)
THE GREAT FLOOD OF THE OHIO. Mil. Engin. 29: 157-162, illus. May-June 1937.

"A word is not amiss concerning the efforts to tie in soil conservation and reforestation with flood control. The writer has nothing but enthusiasm for the two projects. He believes that they are at least as important for the welfare of the country as is flood control, and should be diligently prosecuted. But it simply will not do to advance them as effective flood control measures . . . If we want the real answer to the question: 'Why do floods get bigger?' We must look to the law of probability, which tells us that the longer the country lives the more it will run up against those super floods whose infrequent occurrence span many generations in their cycle."

- TAYLOR, N. R. (2192)
THE RIVERS AND FLOODS OF THE SACRAMENTO AND SAN JOAQUIN WATERSHEDS. U. S. Weather Bur. Bull. 43, 92 pp., illus. 1913.

"This paper will be devoted to a discussion of some of the causes that modify stream flow in the Great Central Valley of California and to the tabulation of such river and rainfall data as are available in connection with flood periods, with notes on various floods that have occurred since 1849, more especially those in the Sacramento watershed."

- [THORNTHWAITE, C. W.] (2193)
HISTORY OF RAINS HELPS FLOOD CONTROL. Ala. Forest News 10:4. November 1936.

Summary of a paper presented at the Upstream Engineering Conference, Washington, D. C., September 1936.

- TODD, O. J. (2194)
CHINA'S OL' MAN RIVER. Sci. Amer. 165: 5-9, illus. January 1937.

The Yellow River, 2,700 miles long, is a great mud-carrying stream in the summer. Earth dikes which keep the river in place are constructed

by hand labor. Ancient Chinese methods of dike building with willow branches and kaoliang stalks bound together with hempen rope are described. With the materials used—stone, earth, kaoliang stalks, hemp, and willow withes—the oriental engineer sets nature to combat nature and the cost is low.

- UNITED STATES CONGRESS. (2195)
CONTROL OF FLOODS IN ALLUVIAL VALLEY OF MISSISSIPPI RIVER. U. S. Cong.
71st, 3rd sess., House Doc. 798, 3 v. 1931.

Volume 1 contains the report of the Chief of Engineers, United States Army, and 12 annexes; volume 2 contains 8 annexes; annex No. 20 is the report submitted by the Department of Agriculture. Volume 3 consists of maps of the plans to accompany the report of the Chief of Engineers.

- UNITED STATES CONGRESS, SENATE COMMITTEE ON COMMERCE. (2196)
FLOOD CONTROL IN THE LOWER MISSISSIPPI VALLEY. Hearings . . . on S. 3531,
a bill to amend the act entitled "An act for the control of floods on the
Mississippi River and its tributaries and for other purposes," approved
May 15, 1928. January 27, 28, 29 and 30, 1936. 74th Cong., 2d sess., 267
pp. Washington, Govt. Print. Off. 1936.

- UNITED STATES DEPARTMENT OF AGRICULTURE. (2197)
THE LAND IN FLOOD CONTROL. 36 pp. April 1937. [Mimeographed.]

A preliminary statement on the responsibility of the United States Department of Agriculture under the Omnibus Flood Control Act of 1936.

- UNITED STATES FOREST SERVICE. (2198)
HELPING TO CONTROL FLOODS AT THEIR SOURCE. 5 pts. [Washington, D. C.]
1937. [Mimeographed.]

Parts 1, 3, 5: A radio discussion by F. A. SILCOX, Chief of the Forest Service, H. H. BENNETT, Chief of the Soil Conservation Service, and MILTON S. EISENHOWER, Director of Information, Department of Agriculture. Parts 2, 4: A radio discussion by F. A. SILCOX, DILLON S. MYER, Soil Conservation Service, and MILTON S. EISENHOWER. Broadcast during National Farm and Home Hour by the National Broadcasting Co. on February 9, 23, 25, and March 5, 12, 1937.

- UNITED STATES SOIL CONSERVATION SERVICE. (2199)
FLOOD MENACE AND EROSION PROBLEM CHALLENGE SCIENTISTS OF MANY FIELDS.
Soil Conserv. 2: 87-94, illus. November 1936.

Water behavior, watershed control, proper treatment and management of land, rainfall statistics and their value were subjects discussed by specialists at upstream engineering conference. At the final session Morris L. Cooke said: "If we are to save our lands and make better use of our waters, we must work out a national procedure which utilizes local autonomy as part of a coordinated national body politic." State compacts, State and regional planning boards, and authorities such as Tennessee Valley Authority are cited as possible answers to the problem of coordination. Includes letter from President Roosevelt to Secretary of Agriculture Wallace authorizing upstream engineering conference.

- UTAH SPECIAL FLOOD COMMISSION. (2200)
TORRENTIAL FLOODS IN NORTHERN UTAH, 1930. Utah Agr. Expt. Sta. Cir. 92,
51 pp., illus. 1931.

"The Commission concludes that the many floods in the State [Utah] in 1930 were due to: a. Uncommonly heavy rainfall, b. Topography and geological conditions favorable to sudden runoff and a large quantity of flood debris, c. Scant vegetation on portions of the watersheds of the canyons . . ." Elimination of grading for a period of years, fire prevention, revegetation of the critical areas of watersheds, and erection of control works at the mouths of canyons that have flooded are among the relief measures advocated.

- VON HERRMANN, C. F. (2201)
THE FLOODS OF MARCH 1912 IN THE SOUTH ATLANTIC AND EAST GULF STATES.
U. S. Monthly Weather Rev. 40: 336-338. March 1912.

"The floods were so extensive that a satisfactory general view can only be obtained by summarizing the main features in each river district." A table

is given of the highest river stages in March 1912, as compared with highest stages previously recorded.

VOORHIS, H. J.

(2202)

UPSTREAM FLOOD CONTROL—SAN DIMAS EXPERIMENTAL FOREST. Cong. Rec. 81: 3410-3411. March 23, 1937.

The San Dimas Experimental Forest is an area of 17,000 acres in southern California. "This area is set aside for research purposes from the Angeles National Forest because the conditions of cover, topography, and soil are typical of the San Gabriel Mountain Area. The purpose of this experimental area is to study the relationship between forest vegetation and water to determine accurately the facts as to the influence of chaparral cover on streamflow, particularly the effect upon flood flows and upon low-water flows. Other features of this work are to determine the consumptive use of water by native vegetation and the value of this vegetative cover in preventing erosion."

WALDRON, B. L.

(2203)

FLOOD REPORT. U. S. Monthly Weather Rev. 39: 1519. 1911.

"The excessive rains of September 25, 27, and 28, and October 1, . . . caused a flood in the North and South Fabius and in North and South Rivers that did a great amount of damage in the valleys of those rivers and the Mississippi bottom lands across from Quincy, Ill. . . . There was no special damage from erosion or deposit . . ."

WALLACE, HENRY A.

(2204)

FLOOD CONTROL AT THE GRASS ROOTS. 8 pp. April 27, 1936. [Mimeographed.]

An address before the National Rivers and Harbors Congress, Washington, D. C., April 27, 1936. Discusses the relation of soil and water conservation to flood control and describes the research work of various agricultural experiment stations.

WALSH, O. E.

(2205)

TAMING THE MISSOURI RIVER. ARMY ENGINEERS ARE RAPIDLY BRINGING THE "BIG MUDDY" UNDER CONTROL WITH DIKES AND REVETMENT. Civ. Engin. 6: 421-424, illus. July 1936.

"The works for navigation have had the incidental result of preventing the erosion of good agricultural land, and have therefore been of tremendous value to property owners in the alluvial valley."

WELLS, E. I.

(2206)

FLOOD AT BOISE, IDAHO. U. S. Monthly Weather Rev. 41: 1104-1105. July 1913.

After the unusual flood which occurred at Boise on July 24, 1913, the writer walked over the greater part of the watershed and found that the erosion was greatest about 4 miles above the mouth of Hull's Gulch. Water-flow measurements were taken, and data concerning them are given.

WEYBRIGHT, VICTOR.

(2207)

RUNAWAY RIVERS. Survey Graphic 25: 295-299, 344-347. May 1936.

"Discusses causes of disastrous floods and control methods. Weather studies are recommended, with the construction of dams and forestation in headwater areas." Not examined.

WHITTINGTON, M.

(2208)

NATIONAL FLOOD CONTROL DEMANDED BY INCREASING HAZARDS AND DESTRUCTION. Cong. Rec. V. 80: 6245-6249. April 27, 1936.

Includes address to be given at the thirty-first annual convention of the National Rivers and Harbors Congress in Washington, D. C., on the same day. The policy of conservation of the soil and of reforestation are favored. Methods of control, the need of research into flood problems by engineers, flood control along the lower Mississippi River, reservoirs and their costs, planning and a national policy, were all considered in this address.

WHITTINGTON, M.

(2209)

THE POLICY AND THE PROGRAM FOR FLOOD CONTROL. Cong. Rec. 81:2967-2971. March 16, 1937.

Address given at St. Louis on March 12, 1937. The Flood Control Act of 1936 is discussed. "If all the projects provided for in the Act of 1936 had been completed, the flood of 1937 in the Ohio Valley would not have been prevented; the losses and damages would have been reduced. . . . All of the works authorized by the Act of 1936 are necessary in the enlarged program that must be adopted to prevent a recurrence of the 1936-37 floods in the Ohio Valley." The speaker exposes and corrects many fallacies as to the causes and remedies for floods. He also considers the question of authorities, in particular the Tennessee Valley Authority.

WINSOR, L. M.

(2210)

THE BARRIER SYSTEM FOR CONTROL OF FLOODS IN MOUNTAIN STREAMS. U. S. Dept. Agr. Misc. Pub. 165, 24 pp., illus. 1933.

"The barrier system of flood and gravel control developed in these investigations appears to have a broad range of application. The success of the barrier system is dependent upon the amount of reasonably smooth surface over which the flood stream may spread before it reaches the stilling pool above the barrier." Examples of this system as used in Utah are presented.

WINTERS, N. E.

(2211)

FLOODS SHOW NEED FOR EROSION CONTROL. The land, Today and Tomorrow 2: 22-24. February 1935.

In describing the results of field experiments on the soil erosion experiment station at Guthrie, Okla., the author finds that the very nature of erosion control makes it a primary step in flood control.

WOODS, A. F.

(2212)

THE CONTROL OF RAGING WATERS. Sci. Monthly 44: 409-417, illus. May 1937.

General article on flood and erosion control, dealing most specifically with the plan for river-bank-erosion control, conceived by Mark W. Woods, of Lincoln, Nebr., which employs the use of the Bignall pile.

WRIGHT, JAMES O.

(2213)

THE PREVENTION OF INJURY BY FLOODS IN THE NEOSHO VALLEY, KANSAS. U. S. Off. Expt. Stas. Bull. 198, 44 pp., illus. 1908.

This bulletin describes the existing situation in the Neosho Valley and outlines in detail a feasible plan for protective relief, based upon extensive field surveys. The use of properly located levees for confining flood waters to the vicinity of the main stream channel is recommended. General specifications for building levees with costs and detailed maps for different sections are discussed.

ZON, RAPHAEL.

(2214)

CAN FLOODS BE CONTROLLED? Forestry News Digest, pp. 4-5. March 1937.

The author reports findings of the Lake States Forest Experiment Station which "contribute tangible knowledge of the part which cleared pastures and grazed and ungrazed woodlots play in preventing run-off and erosion on steep slopes." Bluegrass sod is believed to be capable of preventing run-off and erosion.

FOREST COVER IN SOIL AND WATER CONSERVATION

ANONYMOUS.

(2215)

ALARMING FOREST CONDITIONS IN COLORADO. Forester 7: 280-286, illus. November 1901.

F. H. Newell of the United States Geological Survey, is quoted: "... rapid erosion among the mountains has been due to cutting and burning the timber and brush, and the overgrazing of the lands thrown open to the passage of cattle by the destruction of thickets and underbrush. Thus not only is the state losing one of its most valuable resources in timber, the material needed by the farmer and the miner, but also the soil valuable

in one locality is being carried away to become a nuisance in another." The writer urges cooperation among the citizens, the State, and the United States for the preservation of forests.

ANONYMOUS.

(2216)

BLACK LOCUST POST SEVENTY FIVE YEARS OLD IS STILL IN USE. *Forestry-Geol. Rev.* 6:2. September 1936.

This post was found by soil conservation workers on a Jackson County farm. The value of black locusts in all erosion-control work is great. "They will grow on denuded areas, on gully banks, and . . . very effectively prevent the washing away of soil." Its qualities as a supplier of nitrogen are also stressed.

(2217)

C. C. C. TO PLANT HALF BILLION TREES. *Amer. Forests* 42: 325. July 1936.

Discusses forest-planting program for 1936 and 1937, with notes on varieties to be planted, areas to be planted, and special plantings for watershed-erosion control and for wildlife protection. The number of trees allotted to the different States is given.

(2218)

CONSERVATION OF RESOURCES. *Forest Leaves* 11: 133-135. June 1908.

The writer discusses and quotes excerpts from papers given at a conference called by President Theodore Roosevelt May 13-15, 1908, to consider conservation of natural resources. "Every step of the progress of mankind is marked by the discovery and use of natural resources previously unused. But the time has come to inquire seriously what will happen when our forests are gone . . . when the soils shall have been further impoverished, and washed into the streams, polluting the rivers, denuding the fields and obstructing navigation. We are on the verge of a timber famine in this country . . ." A plea is made for legislation providing for the wise utilization of forests and conservation of water resources.

(2219)

"DESOLATED PENNSYLVANIA." *Forest Leaves* 14: 115-116. April 1914.

Quoting from a lecture by J. T. Rothrock, the writer points out that one-sixth of the State of Pennsylvania is unproductive, depopulated, and fast going into a desert condition. "Not only is the soil which we have denuded of timber in great part unfit for any other crop than timber, but owing to neglect, it is fast being further impoverished by the fires and floods which are allowed to sweep over it without adequate restraint. If there is one fact that we may consider as proven in the latest utterance of science it is that forests do aid in conserving the rainfall, and in so far maintain the even flow of water in our streams and springs."

(2220)

THE EFFECT OF FORESTS UPON STREAM FLOW. *Forest Leaves* 13: 137-138. June 1912.

Pittsburgh flood commission report is discussed. "The report has a valuable appendix on 'The Forest Conditions on the Allegheny and Monongahela River Basins,' giving the conditions of the forests and humus on the watersheds of these streams, and showing the effects they exert on the runoff and erosion. In summing up it states that there is a constant deterioration of the soil, humus and forest growth. Erosion seems to be confined almost entirely to cleared land . . ."

(2221)

EFFECTS OF DEFORESTATION. *Forester* 1: 49-50. July 1895.

"It seems well-nigh impossible to awaken the people of this country to the danger that threatens our prosperity through our continual indifference to the forestry question." The elements are turning abandoned land into a desert, the writer claims.

(2222)

FLOOD CONTROL BY REFORESTATION IN MISSISSIPPI. *Science* 66: 146-147. August 12, 1927.

The object of an extensive survey, started by the Forest Service, as to the location and area of forests needed on the Mississippi watershed as a part

of flood prevention and control is to bring out on this enormous drainage basin the area or watersheds where, on account of rainfall, character of soil, topography, etc., forest cover has an important protective value.

ANONYMOUS.

FLOOD DAMAGES. Forest Leaves 2: 85-86. August-September 1889.

(2223)

The author discusses excerpts from Floods and Their Causes (Lippincott's Magazine, August 1889), in which it is stated "decadence is chiefly due to the devastation of river-floods, caused by the agency of man . . . by the disappearance of arboreal vegetation, and especially by the destruction of the land-protecting highland forests." A plea for protection of forests is made.

(2224)

FOREST DESTRUCTION AND ITS EFFECTS. Nature [London] 119: 37-39. January 8, 1927.

This article deals mainly with forest conservation in India, where lumber exploitation has in many sections so denuded the highlands and slopes that excessive erosion and gradual silting up of rivers are now a national problem. The methods of control used by the forest department of the India Government are discussed.

(2225)

FOREST FIRES AFFECT STREAM FLOW. Forest Leaves 14: 134. June 1914.

The writer discusses the changed flow from a watershed at Wallace, Idaho, resulting from forest fires. "In view of the situation, the Forest Service has undertaken to reforest the denuded watershed. The experts of the department, however, point out that the planting will probably have no immediate effect, yet it should influence run-off as soon as forest conditions are restored, and re-establish eventually a more stable streamflow."

(2226)

FOREST GOES TO MILL, SOIL GOES TO SEA. South. Lumberman 116: 43, illus. August 30, 1924.

A gully on a southern homestead is pictured and its start traced to the removal of trees once covering the slope. "Reforestation is an effective means of controlling run-off water and of reclaiming land which has been ruined by gullies and washes."

(2227)

FOREST INFLUENCE ON WATER-FLOW. Forester 6: 113-114. May 1900.

The report of an investigation of the Mill Creek watershed in Pennsylvania for the conservation of available water supply and prevention of alternate floods and droughts is given. The writer cites two important objects attainable by applying improved forest methods: "A more uniform flow of water will result from such management, and the supply will not be affected, as it is at present, by the washing and erosion from denuded areas . . . By the proper management of this forest it can eventually be made a source of considerable income, without lessening its value as a cover."

(2228)

FORESTS AND FLOODS. (Editorial.) Forester 4: 93-94. 1898.

"There are many things in nature which withdraw themselves for the present from exact investigation and measurement, and yet we can by mere reasoning arrive at a conception of the truth, although we cannot prove it. The influence of forests on floods is one of these things." Destruction of forest cover causes increased surface run-off.

(2229)

FORESTS AS CONSERVATORS OF MOISTURE. Forest Leaves 6: 46. June 1897.

The writer discusses the paper of J. R. Sage, chief of the Iowa Weather and Crop Service. "North America is the best-watered of all the grand divisions of the globe, and this was the cause of immense forests with which the pioneers in settlement found much of the country covered. There will never be a season where the United States shall fail to produce sufficient food for the people." He advises the preservation of forests and continued tree planting. "He holds that if one-fifth of the land were devoted to timber

growth there would be a greater yield of crops on the remaining four-fifths, and prophesies that in the coming era of intensive farming, forests and woodland will be important factors."

ANONYMOUS.

(2230)

INFLUENCE OF FORESTS ON WATER RUNOFF. *Forest Leaves* 8: 167. October 1902.

It is estimated that forest-covered soil retains 25 percent more of the annual precipitation than does similar nonforested soil.

(2231)

THE MAGIC OF GROWING TREES IN THE TENNESSEE VALLEY. *Amer. Forests* 42: 14-15, illus. January 1936.

Four photographs comprise this article illustrating the effectiveness of locust trees in preventing erosion at the Sherman Stooksbury project in Union County, Tenn.

(2232)

MANICURING THE WILDERNESS. (Editorial.) *Sat. Evening Post* 207: 22. December 8, 1934.

A comment on the legislation which provides for the Civilian Conservation Camps and its costs. The writer contends that communities, rather than the Federal Government, should have shouldered the responsibility of training the youth of the country.

(2233)

PRESERVING OUR HILLSIDE LANDS. *Jour. Jamaica Agr. Soc.* 34: 249. May 1930.

Exposition of the destruction of forest land in the greed for banana extension. "The restoration of fertility to the soil presents a more impossible point than the maintenance thereof through the careful observance of ordinary commonplace practices."

(2234)

RELATION OF FORESTS TO STREAM FLOW. *Engin. News* 60: 478-479. October 29, 1908.

H. M. Chittenden's paper on the relation of forests to stream flow. *Amer. Soc. Civ. Engin.* (Proc. September 1908) is reprinted, and some of his claims are challenged by the author who doubts the importance of forest influence on stream flow to the extent generally believed.

(2235)

ROBINIA PSEUDOCACIA. *Amer. Nurseryman* 64: 2. November 1, 1936.

The black locust is found to be extremely useful in reforestation and soil-erosion control because of its fibrous, spreading root system in holding soil, and its ability to thrive in dry or poor, sandy soil. The author points out its susceptibility to borers.

(2236)

SINKING MONEY INTO DEAD FOREST LAND. *Business Week*, p. 52. October 24, 1936.

"There are few things more vital for the future of America than the preservation of her forests, and there could hardly be a more irrational way of trying to preserve American forests than the way of the National Forest Reservation Commission. For the commission, instead of putting its money into live forest land, is putting it into land that is dead, and that has practically no chance of being brought back to life . . . We ought to stop buying such land and begin putting out money into virgin timber . . . We would be doing something to save American forests and to promote flood control, soil enrichment, the conservation of wild life, scenic beauty and the magnificent joy of outdoor recreation."

(2237)

600,000,000 TREES FOR EROSION CONTROL. *Amer. Forests* 41: 603. October 1935.

"Approximately 600,000,000 trees and shrubs will be produced by nurseries of the Soil Conservation Service . . . A large share will be used in the reforestation and afforestation phases of erosion-control work on farm and grazing lands."

ANONYMOUS.

(2238)

SOIL EROSION IS BUGBEAR OF CONSERVATION. STATE LOSES THOUSANDS OF TONS OF TOP GROUND ANNUALLY. Calif. Conserv., 1: 29. February 1936.

"Thousands of tons of top soil are being sent into the Pacific Ocean every year through the ruining instead of the working of the soil." Defines the relation of forestry to soil conservation. "Foresters can entrench their profession in no better way than by showing the public that forest practices such as fire protection and tree planting are vital to the continued prosperity of our country."

(2239)

STOPPING WASH IN DITCHES. Wallaces' Farmer, 57: 228, illus. April 16, 1932.

The use of cottonwood, willow, and black locust trees as control measures for ditches and gullies is advocated. Gives detailed instructions for planting trees or cuttings of all three species. A diagram shows how to plant wide ditches.

(2240)

TREES FOR EROSION CONTROL IN OKLAHOMA. Sooner State Conserv. News, 2 (11): 8-9, illus. May 1936. [Mimeographed.]

Describes and gives methods of planting for erosion control the following trees: Black locust (*Robinia pseudoacacia*), honeylocust (*Gleditsia triacanthos*), bois d'arc (*Toxylon pomiferum*) and Russian mulberry (*Morus alba tatarica*). Includes drawings of leaves and fruits.

(2241)

TREES FOR EROSION CONTROL IN OKLAHOMA. Sooner State Conserv. News, 2 (12): 6-7, illus. June 1936. [Mimeographed.]

Describes catalpa, green ash, hackberry, cedar elm, and other elms, as to habitat, growth, uses, and value in control of erosion.

(2242)

TREES VS. SOIL EROSION. Timberman, 28: 35. October 1937.

The results of studies on the effect of forest growth in the prevention of erosion in Tennessee and Iowa are presented. "It was found that the average run-off of surface water during the periods of heaviest rains was some 50 percent greater on the watershed with the least timber . . ."

(2243)

VALUE OF FORESTS. Forester, 2: 20-21. March 1896. [Reprinted from Daily State Gaz., Trenton, N. J.]

The writer discusses lectures by Joseph T. Rothrock and John Gifford on The Relations of Forests to the Surface of the Country and Damage from Forest Fires in New Jersey in 1895, respectively. "Dr. Rothrock said it was a well-established fact that forest lands hold four-fifths of all the water which falls upon them, distributing it gradually upon the soil. In cleared land, on the other hand, four-fifths of the water runs off and only one-fifth goes to the soil." The importance of trees is stressed. Having outlined causes and effects of forest fires, Gifford advocated measures for future protection as, single lines of trees planted along railroads and large tracts of wood intersected by cleared spaces the width of a road.

AHERN, G. P.

(2244)

FOREST BANKRUPTCY IN AMERICA. 319 pp. Strasburg, Va., Shenandoah Pub. House, Inc. 1933.

Short accounts on forestry in each State are brought together in this volume. "The first attempt, so far as the writer knows, to piece together by States an up-to-date story, largely on official data, concerning the forest and wood supply in the entire country . . . Not one acre out of eight of our original forest remains, and the percentage of this remnant devastated each year is greater than ever before . . . We cannot get on without wood, and forests are needed not merely to supply timber and to make forest industries permanent, but to protect streams and soils and wildlife. . . . The immediate and urgent job is to stop forest devastation and start restocking in 125 million acres of remaining commercial forests in private ownership." A program to restore and preserve America's forest wealth is presented.

ANDREWS, F. M.

(2245)

FORESTS AND FLOODS. Ind. Acad. Sci. Ann. Meeting 29: 203-212. 1913.

Data are presented and literature is cited on special studies made to ascertain to what extent the flow of various streams is dependent on forests and surface conditions in general. "Notwithstanding the presence of other factors which may help to produce or prevent floods, the fact remains . . . that deforestation is by far the greatest cause of floods . . ."

APPALACHIAN FOREST RESEARCH COUNCIL.

(2246)

STATEMENT ON THE SOUTHERN APPALACHIAN EROSION SITUATION. Appalachian Forest Research Council (Ashville, N. C.). Proc. 7, 48 pp. June 2, 1931.

Among the subjects covered at this meeting were the following: Forest Management in North Georgia, by L. I. Barrett; Coastal Plains Studies, by A. L. MacKinney; Forest Biology, by T. D. Burleigh; Streamflow and Erosion, by C. R. Hursh, with comments by H. H. Bennett and E. D. Burchard; Research and the Administration of Southern Appalachian National Forests, by J. C. Kircher; and, General Review of Progress of Investigations by the Appalachian Forest Experiment Station, by E. H. Frothingham.

ASHE, W. W.

(2247)

FINANCIAL LIMITATION IN THE EMPLOYMENT OF FOREST COVER IN PROTECTING RESERVOIRS. U. S. Dept. Agr. Bull. 1430, 34 pp., illus. 1926.

"The influence of the forests in protecting reservoirs used for power purposes varies in different regions with the differences in soil, surface, and precipitation. In this bulletin those regions in which this influence is most important . . . are pointed out, also the value of forest cover and the financial limitations in its employment to prolong the utility of a reservoir are discussed."

AUTEN, J. T.

(2248)

THE WOODED EARTH. Amer. Forests 42: 51-53, 94-95, illus. February 1936.

"The key to success in any program of forest restoration and continuous successful management depends on a detailed knowledge of forest soil." The author discusses the three-layer system of virgin forest soils and, with illustrations, shows the results of faulty agriculture, which "has lost the American people an empire . . . Reforestation will solve the erosion and water conservation problems on hill land, but that reforestation cannot be done 'hit or miss' . . . Along with this soil saving must go research in forest soil and a delving into the simple A-B-C soil alphabet which will lay the groundwork for replacement of the forests, not only to provide needed lumber but to make our hill soil safe for all time."

(2249)

EFFECT OF FOREST BURNING AND PASTURING IN THE OZARKS ON THE WATER ABSORPTION OF FOREST SOILS. U. S. Dept. Agr., Cent. States Forestry Expt. Sta. Note 16 (Col.-Ohio) 5 pp., illus. 1934.

"The importance of forests in building and retaining soil porosity and water-absorbing capacity can hardly be overestimated. In many regions, failure of springs and streams, lowering of ground water levels, and serious increase of soil erosion are caused by removing forests from non-agricultural land, or by destroying the effectiveness of forest cover through repeated years of excessive grazing." The author presents test results made on soils in Arkansas and Illinois.

AYRES, H. B., and ASHE, W. W.

(2250)

THE SOUTHERN APPALACHIAN FORESTS. U. S. Geol. Survey Prof. Paper 37: 17-18, illus. 1905.

"The portion of the Appalachian region under consideration extends from Virginia southwestward, and comprises parts of North and South Carolina, Tennessee, and Georgia, between the Piedmont Plateau on the southeast and the Appalachian Valley on the northwest . . . Except along the crests of the ridges, one can hardly travel a quarter of a mile in an undisturbed portion of the forests without finding pure, cool water. These waters filter through moss and leaves a short distance, then follow the clean, stony bed of the brook down the mountains . . . Variation in stream flow has been notably increased by the clearing away of the forest near the sources of the streams."

AYRES, R. W.

(2251)

FIRE AND WATER: HOW THE O. C. C. IS SOLVING THESE ACUTE CONSERVATION PROBLEMS IN CALIFORNIA. Amer. Forests 40: 153-155, illus. April 1934.

The story is told of Jack Talbot, the pioneer, who deliberately burned off the soil cover 50 years ago in the belief that pasture would be improved. "His idea resulted in floods that cost \$5,000,000." Photographs of rock check dams, firebreaks, and truck-trail construction accompany the article. Figures on cost of forest cutting and tons of soil wasted are given.

BAIRD, R. W.

(2252)

EFFECT OF FOREST DENUDATION ON WATER COURSES AND WATER SUPPLY. Amer. Forestry Assoc. Proc. 12: 165-170. September 17-22, 1897.

"In middle Tennessee, fifty years ago, there were 'lasting' springs on every farm. Since the timber has been cut off many of these 'lasting' springs have become 'wet weather' springs." Forest growths serve to retain the rainfall and thus feed the springs and maintain more volume of water in brooks, creeks, and rivers, for longer periods of time. The need is emphasized for study and care of young forest growth, planting and seeding of trees on all land not needed for farm crops. Forests are necessary to good health and streams that have their sources in the woodlands have the purest water for drinking and other purposes.

BAKER, W. M.

(2253)

REFORESTATION PROBLEMS IN THE CENTRAL STATES. Ind. Farmer's Guide 93: 14, 25, illus. February 27, 1937.

An account of the work of the Central States Forest Experiment Station at Columbus, Ohio. Among the studies undertaken there is the determination of the use of forest cover for the conservation of soil, water, and wildlife resources.

BALDWIN, H. I., AND BROOKS, C. F.

(2254)

FORESTS AND FLOODS IN NEW HAMPSHIRE. New England Regional Planning Com. Pub. 47, 28 pp., illus. 1936.

"The purpose of this report is to summarize the facts concerning the present influence of forests on floods in New England and especially in New Hampshire." Discusses rainfall interception by trees, snowfall interception, obstruction of run-off, causes of snow melting, critical areas on which melting and run-off are severe, and results to be expected from planting.

Literature cited, pages 21-23.

—, AND SHIRLEY, H. L.

(2255)

FOREST SEED CONTROL. Jour. Forestry 34: 653-663. July 1936.

The purpose of this paper is to bring out what practical steps have been taken in European countries and what has so far been done in the United States toward assuring supplies of forest tree seed from known sources and of desirable character. A brief orientation of the subject is given, followed by an account of how seed origin is controlled in other countries.

BATES, C. G.

(2256)

THE FOREST INFLUENCE ON STREAMFLOW UNDER DIVERGENT CONDITIONS. Jour. Forestry 34: 961-969. November 1936.

The condition of hilly southwestern Wisconsin and adjacent Minnesota is pointed out by comparing various measures with the standards set up by the Wagon Wheel Gap stream-flow experiment in Colorado. Despite considerable differences in climate and marked differences in soil conditions, it is shown that forest and other vegetation take care of the water situation about equally well in the two areas and that it is only when bared soils enter into the picture that serious consequences are felt.

(2257)

HOW WILLOWS STOP EROSION. Amer. Forests and Forest Life 31: 200, illus. April 1925.

The author describes the work of the Fremont Forest Experiment Station on Mount Manitou. "A thousand willow cuttings were planted each spring from 1910 to 1916 in the moist bottom of the ravine where there

was an underflow . . . Although large volumes of water came down this ravine in 1922 and 1923, no gravel has been carried out of it. Instead, it is slowly being filled."

BAUER, H. L.

(2258)

MOISTURE RELATIONS IN THE CHAPARRAL OF THE SANTA MONICA MOUNTAINS, CALIF. Ecological Monog. 6: 409-454, illus. July 1936.

"As the chief vegetative cover of the watersheds of southern California, chaparral is of great economic importance in that it lowers the loss of water through surface run-off, increases the flow of clear water in streams, and decreases the probability of serious floods and erosion. The investigation herein reported is concerned primarily with the moisture relations in a representative area of California coastal chaparral."—Introduction.

BENNETT, H. H.

(2259)

DRAMA OF WRATHFUL WATERS. Amer. Forests and Forest Life 33: 323-327, 368, illus. June 1927.

The author makes a survey of nature's most destructive force—water, and by photographs of land devastation such as canyons, gullies, and ravines, shows its effect on soil. "The creation of the great system of National Forests in the West affords partial protection at least against the destructive wrath of many of the more important rivers."

(2260)

FORESTS—ANCHORS OF THE HILLS. Nature Mag. 9: 385-388, illus. June 1927.

The author discusses some national aspects of the soil-erosion problem and describes the ravages of soil wastage in various parts of the country. He comments on the results of a soil-erosion survey of the central part of the Appalachian system. "Annually our farmers are losing at least \$200,000,000, by erosion. The actual loss to the Nation is far greater than this; it is incalculable . . ." Data on terracing are given, and reforestation is cited as an important remedial factor.

(2261)

VERMONT'S ANCHORED HILLS. Amer. Forests and Forest Life 35: 21-23, 42, illus. January 1929.

Overwash of deep blankets of coarse sand and gravel was brought under control by the planting of Scotch pines to prevent the sand from drifting. "That Vermont's hills for the most part were securely anchored with trees and herbaceous growth, ferns, and moss, and blanketed over with a sponge-like covering of forest litter, with a highly absorptive layer of forest-mold beneath, explains why only a part instead of all the meadow lands of the flooded valleys were covered with erosional-debris of inert sand, gravel and stones."

BERTHOUD, E. L.

(2262)

WHAT SHALL WE DO FOR THE FOREST? SYMPOSIUM. Forester 5: 129-132, 1899.

Mountain slopes have been denuded of trees by miners and by destructive fires. This denudation "has furrowed with ravines and covered with sand and loose rock acres of good soil." Need of forest legislation, advisability of forest culture, and restricted sheep grazing are treated.

BIRCH, T. W.

(2263)

THE AFFORESTATION OF BRITAIN. Econ. Geog. 12: 1-26, illus. January 1936.

The history of British forests and forest laws is divided into four distinct periods: (1) Destruction; (2) private enterprise; (3) enquiry—all of which led to (4) state action. A report, commonly referred to as the Acland report furnished the starting point for state entry into afforestation on a large scale. Three reasons, chiefly economic, are given for the present policy, but it is said that "two other aspects of afforestation are worthy of mention, namely rain run-off and enclosure. The first of these is not a question of soil erosion, so frequently associated with deforestation, for the areas under consideration often bear a peaty turf, and erosion is negligible. It is concerned with floods, which periodically are a source

of expense and anxiety in some thickly populated districts . . . The afforestation of well-chosen districts may well regularize run-off, and decrease the liability of these rivers to flood."

BODE, I. T. (2264)

TREE PLANTING A PART OF EROSION CONTROL. Iowa Agr. Col. Ext. Bull. 166, 4 pp., illus. 1930.

How tree planting fits in, what to plant, sources of material, how to plant, and the use of supplementary methods in erosion control tree planting are discussed and illustrated.

BREGGER, J. T. (2265)

THE ROLE OF NUT TREES IN EROSION CONTROL. Pa. Nut Growers Assoc. Proc. 5: 20-22. 1937.

The author points out that black walnut, aside from being a good nut and lumber producer, is excellent for steep, severely eroded land and rocky slopes unfit for cultivation or pasture. Hickory trees are also recommended for thin soils and places too dry for black walnut.

BROOKS, C. F., AND BALDWIN, H. I. (2266)

HOW FORESTS RETARD FLOODS. Amer. Forests 43: 274-277, 316-317, illus. June 1937.

"No policy of flood control can neglect to take into account the effect of forests in reducing the amount of water, in the form of rain, or snow, that reaches the ground, in reducing the rate of release of water from melting snow, in promoting infiltration, and in obstructing the rate of runoff and conserving soil."

BRUERE, M. B. (2267)

HERE ARE FORESTS; THEIR RELATION TO HUMAN PROGRESS IN THE AGE OF POWER. 27 pp., illus. U. S. Forest Serv. 1936.

This article was prepared for the third World Power Conference. "One-third of the United States is forest land. Along the road toward higher civilization we have come beyond the Age of Steam into the Age of Electricity. We have a rising population which makes steadily increasing demands on the limited sources from which electric power now comes. Can our forests increase the supply?" The author answers in part: "By protecting the watersheds and by producing fuel, the forests can help keep the American 'grid' straining full forever." The relation of electric power to trees is pointed out through silting causing dams to become useless. Trees planted along water courses for holding the soil in place will prevent this.

BURGER, H. (2268)

PARTNERSHIP OF WOOD AND WATER. Amer. Forests 38: 196-201, illus. April 1932.

The author writes of forest-conservation methods in Switzerland and his inspection of the Rappengraben and Sperbelgraben watersheds, scene of the stream-flow experiments of the Swiss Forest Experiment Station. "Only a vigorous and well-kept forest, made up of the proper species of tree, can lessen the fear of flood and only a well-kept forest can insure keeping the earth in a correct condition to conduct large volumes of quickly sinking water to the underground reservoirs which feed our rivers in times of drought or frost, work the mills, the sawmills, the factories and the electric power plants." The foreword is by A. C. Ringland.

BURR, EDWARD. (2269)

THE INFLUENCE OF FORESTS ON STREAM FLOW IN THE MERRIMAC RIVER BASIN, NEW HAMPSHIRE AND MASSACHUSETTS. U. S. Cong. 62d, 1st sess., House Doc. 9: 7-32. 1911.

Describes the basin and its local soil and forest conditions, gives precipitation and run-off data, and discusses climatic and general flood conditions. The author concludes that the frequency of floods has not been decreased by reforestation or increased by deforestation.

- BUTLER, O. M., (2270)
 AMERICAN CONSERVATION IN PICTURE AND IN STORY. 144 pp., illus. Washington, D. C. 1935. [Published by The American Forestry Association.]
 Partial contents: An Historical Survey of Forests and the Part They Played in Pre-historic and Present-day America; The Story of Lumbering; The Dawn of Conservation; The Growth of State Forestry; Indian Forests; Problems of Water and Conservation of the Soil; The Civilian Conservation Corps; Conservation and the Lumbering Code.
- CABIANCA, S. (2271)
 RECENT RESEARCH ON THE INFLUENCE OF FORESTS IN CHECKING EROSION AND SURFACE RUN-OFF. [Internatl. Rev. Agr.] Monthly Bull. Agr. Sci. and Pract. [Rome] 23 (1): 25-35. 1932.
 "A summary of investigations by others bearing on the subject is presented under the headings of evolution of land reliefs, retention of water by the soil, evaporation, control of run-off and stream flow, and erosion. A list of 20 references is included."—Expt. Sta. Rec. 67: 607. 1932.
- CALIFORNIA FOREST AND RANGE EXPERIMENT STATION. (2272)
 THE SAN DIMAS EXPERIMENTAL FOREST. 19 pp., illus. [Washington, Govt. Print. Off.] 1936.
 Outlines experiments to be conducted and the methods of attack. "The investigations to be conducted on the forests have, in general, a two-fold purpose; first, to make a quantitative determination of the relation of chaparral vegetation to the yields of usable water from mountain watersheds and of its function in reducing erosion; second, to develop methods of management or treatment of the vegetation in order to obtain a maximum yield of usable water with a minimum amount of erosion."
- CALVIN, ROSS. (2273)
 HOW MAIN STREET BECAME THE BIG DITCH. Soil Conserv. 2: 102-105, illus. November 1936.
 A description of the flood of Silver City, N. Mex., in 1895 and its results. Denudation of woodlands and overgrazing, the author states, were among the chief causes of the increasing frequency of floods. The benefits of Federal control over forest reserves are shown.
- CARY, AUSTIN. (2274)
 COMMON SENSE IN CONSERVATION. Jour. Forestry 34: 234-243. March 1936.
 The writer has witnessed the development of forestry through 40 years of service and reviews its steps from the early lumber industry. Reforestation projects in the Southern States in 1920 are outlined. Timber growth and fire prevention are stressed.
- CHAPMAN, A. G. (2275)
 A BASIS FOR SELECTION OF SPECIES FOR REFORESTATION IN THE CENTRAL HARDWOOD REGION. U. S. Dept. Agr., Forest Serv., Cent. States Forest Expt. Sta. Note 29, 6 pp. 1936.
 "Although species most suitable for quickly developing forest cover are of first consequence, especially for erosion control planting, attention should be given to the relative values of the final planted crops . . . Until we can secure substantial data from mature stands of carefully planned experimental plantings, we are justified in making large scale plantings only on the basis of ecological principles applied to the native species of the region."
- CHAPMAN, H. H. (2276)
 FORESTS AND FLOODS IN CHINA. Amer. Forestry 25: 835-843, illus. February 1919.
 The author cites the pioneer work of Dau Yang Lin, graduate of the Yale Forest School, in studying the effects of floods in China and the influence of forests for control. Erection of barriers, dams, and reservoirs and reforestation of denuded slopes are the only hope of checking soil erosion. ". . . without reforestation the plains of China will continually be subject to floods of greater severity."

CHITTENDEN, H. M.

(2277)

FORESTS AND RESERVOIRS IN THEIR RELATION TO STREAM FLOW WITH PARTICULAR REFERENCE TO NAVIGABLE RIVERS. Amer. Soc. Civil Engin. Trans. 62: 245-318, illus. 1909. [With a discussion by F. Collingwood and others, pp. 319-546.]

This paper describes the effects of forests upon rainfall run-off, the influence of forests on snow melting, and artificial reservoirs in their relation to stream flow. The author states among other conclusions that the bed of humus or debris that develops under forest cover retains precipitation during the summer season more effectively than soil or crops on deforested land similarly situated; that the effect of forests on the run-off resulting from melting snow is to concentrate it into brief periods thereby increasing the severity of freshets; that soil erosion does not result from forest cutting in itself but from subsequent cultivation practices.

CHURCH, J. E., JR.

(2278)

RESTRAINING EFFECT OF FORESTS ON SUDDEN MELTING OF SNOW. Engin. Rec. 69: 674. June 13, 1914.

Data are presented "in modification of the belief of some that the forests tend to cause rather than to prevent floods."

CLAPP, E. H.

(2279)

REFORESTATION AS A PRINCIPAL FACTOR IN SOIL CONSERVATION AND FLOOD CONTROL. 11 pp. 1936. Issued by U. S. Forest Service. [Mimeographed.]

In an address given before the Connecticut Engineering Congress at Bridgeport, Conn., July 25, 1936, the author indicates the close relationship of reforestation to soil conservation and flood control, and proves that a solution of the soil-erosion problem is not possible without the aid of coordinated reforestation practices. Data on erosion and run-off are given for localities in Wisconsin, the southern Appalachians, and California.

CLELAND, H. F.

(2280)

EFFECTS OF DEFORESTATION IN NEW ENGLAND. Science (n. s.) 32: 82-83. July 15, 1910.

The author points out the less disastrous effects of deforestation in New England as compared with sections of the South. "The reason for this difference in the amount of erosion under similar conditions of slope and vegetation between glaciated New England and the non-glaciated regions to the South is to be found in the soil and climate . . . the till of New England is not favorable to erosion because the pebbles and boulders of the till are constantly diverting the water . . . and lessening its velocity. . ."

CLOTHIER, G. L.

(2281)

RECLAMATION OF FLOOD-DAMAGED LANDS IN THE KANSAS RIVER VALLEY BY FOREST PLANTING. U. S. Forest Serv. Cir. 27, 5 pp. 1904.

Lands injured by the flood of 1903 are classified as sanded, eroded, and caving river banks. Recommendation is made for planting eroded land to black walnut or hardy catalpa. The best way to manage land that has eroded and subsequently silted is to let it grow up to willows and cottonwoods. "The trees will collect the silt at each rise in the river, and will assist in building the soil up to its former level."

CRAIG, RONALD.

(2282)

THE SOUTH'S NO-MAN LAND. Amer. Forests 41: 684-685, 712, illus. December 1935.

The author discusses the tax-default acreage of various Southern States and from studies made concludes that the primary cause of forfeiture was mismanagement and lack of protection of timber by the owners prior to forfeiture.

CRISTADORE, C.

(2283)

THE RACE FOR THE LAST TREE AND THE FUTURE OF THE MISSISSIPPI RIVER. Barrel and Box 13: 30-31. August 1908.

"Unless the loyal support of our citizens is given the government to sustain the Mississippi reservoirs and Forest reserves, it would be goodbye forever to all dreams of a water-borne commerce which would enrich the

State." The dangers of deforestation, the denudation of watersheds, and the necessity for State and national reforestation are stressed.

- CROSS, P. G. (2284)
OUR FRIENDS THE TREES. 334 pp., illus. New York, E. P. Dutton & Co., Inc. 1936.

In Chapter 1, Trees and National Welfare, the author says: "You are committing economic suicide when you ignore trees in the scheme of life. He who recklessly slaughters trees with no thought for the future is betraying his country. Just as prevention is superior to cure, so conservation is superior to reforestation. Not flood control, but flood prevention, is the great desideratum." Chapter 26 on Soil Pointers discusses plant food, drainages, and soil qualities in relation to prevention of soil erosion. "Each year erosion bites from the farm area in the United States the enormous total of 63,000,000 tons of top soil. Unless you mend your national ways erosion will destroy you!" Tree treatment, pruning, and surgery are discussed.

- CRUMLEY, J. J. (2285)
THE ROOTS OF TREES AND EROSION. Ohio Forester 9: 20. April 1917.

The author questions whether roots of trees actually bind the soil together and prevent erosion on hillsides and bank cutting along streams. In support of his contention he says: "The mulch covering over the forest floor in an unpastured and undisturbed woodland has a remarkable capacity for holding water. Herein is the source of protection rather than in the roots of the trees. We have noticed also that erosion will take place in soil filled with the roots of trees if the protective covering, through pasturing or exposure to the winds, has been destroyed from the surface of the ground."

- CULBERTSON, G. (2286)
DEFORESTATION AND ITS EFFECTS AMONG THE HILLS OF SOUTHERN INDIANA. Ind. State Bd. Forestry Ann. Rept. 13: 84-100, illus. 1913.

"It is the purpose of this paper to treat of some of the questions, geological and meteorological, as well as economic, arising from the deforested conditions found in the hills of southern Indiana . . . One of the most striking effects of deforestation of this region has been upon the 'immediate run-off' of streams . . ." See also Ind. Acad. Sci. Proc. 24: 27-37. 1908.

- CUNO, J. B. (2287)
UTILIZATION OF BLACK LOCUST. U. S. Dept. Agr. Cir. 131, 19 pp., illus. 1930.

This circular describes planting, cutting, marketing, and general utilization of black locust. Among other advantages is its ability to grow vigorously and rapidly when young under a wide range of soil and climatic conditions, combined with abundant reproduction by seeds and by stump and root sprouts, which makes the tree valuable for checking erosion on denuded slopes.

- DANA, SAMUEL T. (2288)
BENEFICENT EFFECTS OF FOREST COVER. Canad. Forestry Jour. 14: 230-231. May 1919.

The protection given by forest cover for combating soil erosion is pointed out. "The action of the forest in reducing surface run-off tends also to regulate the flow of streams. Excessive erosion may interfere seriously with navigation by filling the streams with material which is deposited in their lower reaches and in the harbors into which they empty." The damage to storage reservoirs by silting is considered.

- (2289)
FARMS, FORESTS, AND EROSION. U. S. Dept. Agr. Yearbook 1916: 107-134, illus. 1917.

Data are given on the injury to farm lands and agricultural and other industries of the United States resulting from erosion and floods. A direct relation between these and deforestation of the higher areas is shown.

- DANA, SAMUEL T. (2290)
FLOODS AND EROSION, CAUSE AND CURE. *Canad. Forestry Jour.* 14: 159.
April 1919.

Damage resulting from interference with forest cover is shown in the story of a buried ranch, and other examples.

- (2291)
NATIONAL FORESTS AND THE WATER SUPPLY. *Amer. Forestry* 25: 1507-1522, illus. December 1919.

The history of precipitation and water power development in the West is reviewed at length. "Every user of water which originates in the National Forests—and this includes by far the greater number of water users throughout the West—must look to the forest for safeguarding his supply."

- (2292)
WHAT THE NATIONAL FORESTS MEAN TO THE WATER USER. 52 pp., illus. U. S. Forest Service. 1919.

"Perhaps the most obvious relation that exists between forests and water is the tendency of the tree cover to check erosion." In describing successful irrigation the writer presents photographically what water will do before and after irrigation projects are established.

- DAVENPORT, WALTER. (2293)
THE WOODS AND TEMPLED HILLS. *Collier's Weekly* 92: 10-12, illus. September 9, 1933.

This article states the opinion of a Government fire lookout in the Ouachita National Forest regarding the C. C. C. The writer contends that the new roads built by the C. C. C. aid greatly in fighting forest fires.

- DEMMON, E. L. (2294)
FORESTS NEEDED TO RESTORE ERODED MISSISSIPPI BLUFF LAND. *Forest Worker* 5: 12-13. January 1929.

"In order to stop erosion in this region it is absolutely necessary that a new forest cover be established on an extensive scale."

- DETWILER, S. B. (2295)
THE HISTORY OF SHIPMAST LOCUST. *Jour. Forestry* 35: 709-712, illus. August 1937.

"Shipmast locust (*Robinia pseudoacacia* var. *rectissima*) is a much better tree than the ordinary black locust (*Robinia pseudoacacia* L.) in erosion control operations. Shipmast locust overcomes many objections to use of black locust in erosion control operations, because of its straighter trunk, greater resistance to borer-attack, and exceptional durability of its wood in contact with the soil." Its enduring quality for fence posts also is pointed out.

- DOCK, M. L. (2296)
FORESTRY, DESTRUCTIVE AND CONSTRUCTIVE. *Forest Leaves* 7: 139-142. June 1900.

The author reviews Pennsylvania forest conditions. The result of present conditions on mountains, valleys, and communities of the higher portions of the State are compared with the intensive forestry methods of the Black Forest. Cuttings and forest nurseries are discussed.

- DONNELLY, C. (2297)
PERTH COUNTY'S WINNING CONSERVATION ESSAY. *Farmer's Advocate* 72: 271. June 10, 1937.

Reafforestation for the control and prevention of floods is advocated. Individual farmers should cooperate in care of small wood lots and wildlife. "Forests supply water to springs, creeks and wells in much the same manner as a reservoir."

- EBY, HARRY G. (2298)
SOIL EROSION. Pa. Dept. Forests and Waters Serv. Letter, Ser. 6 (21): 1-2, illus. May 23, 1935.

Figures on soil-eroded acreages in various States are given. "Studies of soil erosion problems should be correlated with such important subjects

as soil analysis, plant ecology, rainfall and climate, as these factors apply to each section. . . . In reforesting eroded land . . . the forester may find it necessary to content himself with the growing of a tree crop whose wood is of secondary importance." Various species of hard pine are ideally suited for planting on impoverished soil where moisture conditions are fair.

FANKHAUSER, F. (2299)

THE SIGNIFICANCE OF AFFORESTATION IN PREVENTING AND CORRECTING TORRENTS.

Forester 3 (11) (pt. 2): 126-129. November 1897.

"It will be seen that the torrent to be conquered is attacked by the forester at its source where its forces are as yet scattered, and thus easily tamed. Here by means of forestation we are able on the one hand to retard the water, and on the other hand to secure the soil. In this way only is a lasting remedy of the evil possible." The author cites examples of successful afforestation on steep slopes of France and Switzerland.

FERNOW, B. E. (2300)

TREE-PLANTING IN FORESTLESS REGION. Nebr. State Bd. Agr. Rept. 1896: 348-349. 1897.

The author speaks of "a small trial plantation in the sandhills of Nebraska, described in the Annual Report for 1891." He is speaking of conifers and says that "mixed planting and close planting are undoubtedly the proper methods of establishing quickly forest conditions."

FINLEY, W. W. (2301)

FOREST AND SOIL CONSERVATION. South. Lumber Jour. 26: 41-42. October 15, 1910.

The author discusses the broader issues of the soil-conservation problem and recommends various land-use policies for control. The relation of stream conservation to forestry and soil conservation is shown.

FORBES, R. D. (2302)

FORESTS AND FLOOD CONTROL. Forest Leaves 26: 19-20. October 1936.

Remarks made at meeting of American and Pennsylvania Forestry Association, Eagles Mere, Pa., September 10, 1936. W. C. Lowdermilk's percolation experiment is described.

RULING THE RIVER. Sci. Monthly 38: 524-533, illus. June 1934. (2303)

This article discusses the important role played by forests in regulating stream flow and the influence of vegetative covering on erosion and runoff. The areas considered are the Tennessee Basin and southern California.

GARRISON, F. L. (2304)

EFFECTS OF DEFORESTATION IN CHINA. Forest Leaves 8: 75-78. October 1901.

The history of China's forests, floods, and agriculture is reviewed. Various causes of the extermination of forests are suggested such as rainfall decrease in frequency with increase in violence, the hunger of the peasants which forces them to eat grass and roots, the fear of wild beasts, and the destruction of cover for them.

GIFFORD, J. (2305)

THE EXPLOITATION OF WASTE LAND IN HOLLAND. Forester 2: 72-76. December 1896.

The writer tells of a Dutch society, *Nederlandische Heide Matschapig*, similar to the New Jersey Forestry Association, whose "objects are to promote the exploitation of the dunes, heaths, and other desert places; to give advice; to form nurseries, and sell trees at cost price; to educate the people in the principles of forestry . . ."

GLEISSNER, M. J. (2306)

THE RELATION OF THE SURFACE COVER AND GROUND LITTER IN A FOREST TO EROSION. Forestry Quart. 12 (1): 37-40. 1914.

"The author cites the experience in a Bavarian forest to show that the constant removal of forest litter is an important cause of erosion on hill-

sides. The prevention of erosion under these conditions by the construction of a series of horizontal transverse ditches is here described."—Expt. Sta. Rec. 30: 743. 1914.

- GOBLE, W. C. (2307)
THE FOREST A SOIL PROTECTOR. Ind. State Bd. Forestry Ann. Rept. 13: 82-83. 1913.

The writer presents examples of forest soil protection. "The forests of the hilly section of our State have played an important part in the conservation of the soil by keeping it from eroding or washing away . . ."

- GOODMAN, R. B. (2308)
CONDITIONS CONFRONTING THE PRIVATE TIMBERLAND OWNERS IN THE PRINCIPAL FOREST REGIONS. Jour. Forestry 34: 221-225. March 1936.

The three phases of forest protection, namely, prevention, detection, and suppression are analyzed. Forest taxation, surplus and exhaustion, multi-purpose forestry, and watershed protection are among the points covered in this paper. Presented at the thirty-fifth annual meeting of the Society of American Foresters, Atlanta, Ga., January 27-29, 1936.

- GRATTAN, C. H. (2309)
THEY DIDN'T SPARE THE TREES. Scribner's Mag. 97: 287-290. May 1935.

Discusses forest denudation and its consequences on an area of 71,000,000 acres in the northern portions of Michigan, Wisconsin, and Minnesota. "At present, but one-third of the cut-over is in farms and but one-eighth of the area in farms is in crops. Between 1920 and 1930 there was a net decline of 2,600,000 acres in agricultural use."

- GRAVES, H. S. (2310)
THE NATIONAL FORESTS AND THE FARMER. U. S. Dept. Agr. Yearbook 1914: 65-88. 1915.

This article deals with various aspects of forest conservation in the Pacific Northwest. In discussing soil washing and floods the author says: "To eliminate such floods it is essential to eliminate the conditions which give rise to them. With the watersheds under protection, grazing is adjusted to give nature a chance to revegetate the untimbered slopes; timber cutting is so planned as to protect areas of critical position against erosion and floods; and investigations are under way to develop feasible means of repairing damage where erosion has progressed to a degree beyond repair by nature alone."

- GREELEY, W. B. (2311)
THE PART OF FORESTRY IN FLOOD CONTROL. Amer. Forests 33: 409-410, 446-447. July 1927.

The author discusses statements made by Gifford Pinchot. It is contended that floods have become a national problem, largely due to deforestation, clearing of lands, and drainage of swamps. The necessity is stressed for working out means for permanent control of rivers. Levees are recognized as the first line of defense, while spillways, reservoirs, reforestation and other relief measures, with forestry the handmaiden of engineering, are essential for flood control.

- GREEN, H. A. (2312)
WORN-OUT LANDS. Forest leaves 3: 18-19. April 1890.

The author describes the common farming practice in the South of working a piece of ground as long as it will produce and then discarding it. He claims that these worn-out lands can be restored by planting trees. The China tree, pride of India, ailanthus, catalpa, and poplars are recommended as quick-growing trees for this purpose.

- GRIFFIN, A. A. (2313)
INFLUENCE OF FORESTS UPON THE MELTING OF SNOW IN THE CASCADE RANGE.

U. S. Monthly Weather Rev. 46: 324-327, illus. July 1918.

Studies of snow melting on three separate watersheds were carried out which show the value of forests to irrigation interests. Areas described are Tumalt, Wind River, and Yakima. In his summary the writer states that the depth of snow retained was considerably greater in a dense forest than in an open forest, at least during the latter part of the melting season.

HAIN, F. H.

(2314)

THE PRACTICAL VALUE OF FORESTS TO THE SURFACE OF THE COUNTRY. Forest Leaves 5: 154-156. August 1896.

Discusses the comparative value of forests and dikes in flood prevention and recommends tree planting for protection against the dry winds of Indian Territory, Kansas, and Nebraska. The need for the Government to engage in forestry is pointed out.

HALL, A. G.

(2315)

SOLVING OUR FLOOD PROBLEMS WITH TREES. Penn. State Farmer 24: 9, 13, illus. April 1931.

A study of soil washing and its prevention through protective vegetation and forest plantings is presented.

HALL, W. L.

(2316)

FORESTRY RESERVATION ON THE MONONGAHELA RIVER WATERSHED. Forest Leaves 11: 101-103. February 1908.

In discussing the Monongahela watershed, Hall attributes the increased precipitation and cooler climate which causes less evaporation to the high elevation of the source of this watershed. "In consequence of this there is more water to be discharged from the mountains. The whole upper part of the Monongahela watershed is made up of steep slopes which allow the water to escape rapidly. The soils of the Monongahela watershed, while not subject to such violent erosion as the soils of the watersheds farther south are nevertheless easily washed away where the slopes are steep and the forest cover lacking." As an element of damage the author considers erosion second only to floods and advocates forest preservation.

HANSEN, G.

(2317)

THE HILLSIDE FARMER AND THE FOREST. Sierra Club Bull. 5: 33-43, illus. January 1904.

"The plow stirs the valley soil, the log-team drags deep furrows over hillsides, and ax and powder assist the weak arms of man in his struggle to cultivate. But of all the agencies that combine to subserve such purpose, none has shown itself of such fierceness as fire . . . It is the mountain ranches who sets them out, the man who struggles to create pastures in the timber-belt, and of his reasons and ways I write in explanation." The writer shows that where such conditions prevail the forest perishes, water vanishes, and the land is left desolate and unfruitful.

HAWGOOD, H.

(2318)

EFFECT OF FORESTS ON WATER SUPPLY. Forester 5: 247-251, illus. November 1899.

Investigations regarding rainfall and percolation relating to water supply through forest influences are discussed by the author, who states that "the efficiency of foliage in mechanically arresting and condensing moisture is well known. If there are doubts, a walk through underbrush on a misty morning will carry conviction to the most sceptical."

HAWLEY, F. M.

(2319)

RELATIONSHIP OF SOUTHERN CEDAR GROWTH TO PRECIPITATION AND RUN-OFF. Ecology 18: 398-405. July 1937.

Literature cited, page 405.

HEISLEY, MARIE FOOTE.

(2320)

OUR FORESTS, WHAT THEY ARE AND WHAT THEY MEAN TO US. U. S. Dept. Agr. Misc. Pub. 162, 34 pp., illus. 1933.

Among the many benefits derived from forest conservation and reforestation, soil conservation, and soil fertility with their attendant advantages are an important factor. This publication describes different aspects of forestry in various regions of the United States, forest utilization and protection, farm forestry (giving data on shelterbelts), and gives a brief review of Federal and State research in forestry.

HEYWARD, FRANK

(2321)

SOIL CHANGES ASSOCIATED WITH FOREST FIRES IN THE LONGLEAF PINE REGION OF THE SOUTH. Amer. Soil Survey Assoc. Bull. 17: 41-42. 1936.

The longleaf pine region extends from North Carolina to Texas. "Studies to date reveal that soils protected from fire are much more penetrable and porous than soils subjected to fire."

HOLSINGER, S. J.

(2322)

THE BOUNDARY LINE BETWEEN THE DESERT AND THE FOREST. Forestry and Irrig. 8 (1): 21-27, illus. 1902.

A brief history of the forests of Arizona is given. "Possibly there is no portion of the United States where the necessity for forest preservation is more keenly felt than in Arizona. I know of no section of the country, except it may be Southern California, where it is of such vital importance. During the past twenty years the farmers in the fertile valleys of Arizona have been absorbed in the herculean task of constructing systems of irrigation." Discussing recent floods from forest destruction, the author states: "The forests in question usually consist of mesquite, Cat-claw, Palo-verde, Tornillo, Ironwood, Chapparal, Manzanita, Walnut, Cherry, Sycamore, Ash and a dozen species of Oak. Even the numerous species of cacti play an important part in the struggle against erosion."

HOOD, GEORGE W.

(2323)

PLANTING OF WOODY PLANTS FOR EROSION CONTROL. U. S. Soil Conserv. Serv. S. C. S. Regional Off. 7, Salina, Kans., Bull. 1, 38 pp., illus. August 1936. [Mimeographed.]

This bulletin presents data on the care of planting stock, methods of planting, gully-site planting for erosion control, and forest planting other than for gullies.

HORTON, R. E.

(2324)

RAINFALL INTERCEPTION. U. S. Monthly Weather Rev. 47: 603-623, illus. September 1919.

This article gives considerable data on comparative interceptive capacities of various species of trees. A discussion on the physics of rainfall interception is also presented.

HOSTETLER, A. W.

(2325)

FOREST PEOPLE; THE CANADIAN WILLOW PLANTER. Amer. Forests 36: 350-352, illus. June 1930.

An interview is recounted with the inventor of what is known as an angular, submerged tree planting used to combat floods and soil erosion. Willow planting on many small tributaries of the Mississippi is recommended as a measure in flood prevention. "Continuous and even tree growth will prevent eddies and stop action of waves and currents. A score of trees springing from each willow log will make the whole face of the levee immune to erosion and burrowing animals. The silt reclaimed from the water sill makes levees thicker." The results of successful experiments are cited.

HURSH, C. R.

(2326)

ERODED OLD FIELDS AS FOREST SITES. Forest Worker 7: 8-9. September 1931.

Analysis of observations made on the more mature old-field forest stands in the Appalachian Mountains.

(2327)

THE FOREST LEGION CARRIES ON. Amer. Forests 38: 16-19, illus. January 1932.

Deforestation has brought about devastation of fertile lands and laid them open to all the forces of erosion. With the aid of photographs the author describes and illustrates the havoc done by erosion of all kinds.

(2328)

FORESTATION AVERTS EROSION ON ABANDONED MOUNTAIN FARM LAND. U. S. Dept. Agr. Yearbook 1930: 282-284, illus. 1930.

"The restoration of worn-out and abandoned agricultural land to forests has been successfully demonstrated. Plantations of northern white pine

on worn-out land in western North Carolina have produced excellent returns. Where abandoned fields are adjacent to timbered areas with seed trees, natural restocking will take place."

IOWA STATE PLANNING BOARD.

(2329)

RESTORE THE FOREST COVER. A GRAPHIC BROCHURE. 27 pp., illus. December 1935. [Lithographed.]

"An attempt is made to show the need for reforestation in parts of Iowa." The results of deforestation and erosion are shown.

JACOT, A. P.

(2330)

TYPES OF FOREST CARPETS. Sci. Monthly 44: 558-563. June 1937.

Discusses duff, mull, and white pine carpets, and the general nature of forest-carpet structure.

JOHNSON, E. W.

(2331)

HARDY TREES AND SHRUBS FOR WESTERN KANSAS. Kans. Agr. Expt. Sta. Bull. 270, 31 pp., illus. 1934.

This bulletin gives advice on the selection of species, preparation of soil, planting and care of trees and shrubs for that section of Kansas considered unfavorable to the growth of many species because of climatic conditions.

JOHNSON, F. A.

(2332)

COVERING NATURE'S NAKEDNESS—A SACRED DUTY. Nature Mag. 26: 302-303, illus. November 1935.

Reforestation and restoration of vegetative cover in the Central States is the subject of this paper. Comments on the proposed great tree belt for the western plains are included.

JOHNSON, F. R.

(2333)

THE INFLUENCE OF THE FOREST IN RETARDING RUNOFF AS BROUGHT OUT BY THE PUEBLO FLOOD. Water Resources 3: 5-11, illus. December 1922.

Describes the havoc wrought by the flood of June 3, 1921, centering at Pueblo, Colo. "The protective action of trees in preventing erosion and in saving property was everywhere apparent."

JUDD, C. S.

(2334)

FORESTRY IN HAWAII FOR WATER CONSERVATION. Jour. Forestry 29: 363-367. March 1931.

"Hawaii practices forestry to increase water resources rather than to add to wood supplies, and one quarter of the land surface is managed for such purpose. Since the water comes mainly from forest areas, its quality and timeliness are vitally affected by the character of the forest. The relation between water resources and forest cover in Hawaii is particularly intimate and delicate and the natural balance must be carefully maintained to prevent its disturbance. The author describes his problems and his organization for managing the protection forests."—Editor's note.

KANTHACK, F. E.

(2335)

DESTRUCTION OF MOUNTAIN VEGETATION; ITS EFFECT UPON THE AGRICULTURAL CONDITIONS IN THE VALLEYS. Agr. Jour. Cape of Good Hope 33: 194-204. August 1908.

The writer comments on the destruction of forest growth in Europe, Asia, Australasia, Africa, and the United States. He sites the policy of President Theodore Roosevelt for reclamation, irrigation, and forestry. The influence of rainfall and conservation of water supply in Australia are discussed at length. "Let us have forests established on the mountains wherever possible, but what we need immediately is a purely passive forest policy . . . unless the true nature of the evil (forest denudation) is quickly realized, and protective measures taken, the reclothing of the mountains with vegetation will be a practical impossibility."

KAUFFMAN, ERLE.

(2336)

CIVILIAN FORESTERS IN FLOOD TIME. Amer. Forests 39: 454, 455, illus. October 1933.

A brief description of the work being done by the C. C. C. in flood control, reforestation, and soil conservation in Colorado.

KELLOGG, L. F. (2337)

BLACK LOCUST PLANTING FOR EROSION CONTROL. Ohio Cent. States Forest Expt. Sta. Note 3, 5 pp. 1933.

The author asserts that the value of forest cover on nonagricultural lands for erosion control is now definitely established and points out the beneficial effects of black locust in improving the site and stimulating the growth of associated trees by the fixation of nitrogen. Planting methods and mixture of species are advised.

KITTREDGE, J., JR. (2338)

FORESTS AND WATER ASPECTS WHICH HAVE RECEIVED LITTLE ATTENTION. Jour. Forestry 34: 417-419. April 1936.

The high value of water from California mountain watersheds is pointed out and possibilities of increasing the water yield by forest management are suggested. "Run-off or streamflow is the residual water after the losses by transpiration, interception, evaporation and deep seepage have been deducted from the precipitation. The rainfall and the deep seepage are little, if at all, influenced by the vegetation. There remains, therefore, the losses by transpiration and interception of the vegetation and evaporation from the soil, which vary with the kind, size and density of the vegetation and are therefore water losses which influence run-off and are subject to modification by forest management. The changes in these three factors with changes in the age, size, and density of forest cover will be followed."

Literature is cited.

KOTOK, E. I. (2339)

SOLVING THE FOREST AND WATER RIDDLE. Amer. Forests 38: 488-491, illus. September 1932.

This article deals with results of experiments which show the beneficial effects of forest and other plant cover upon stream flow and water conservation. Surveys in the Mississippi uplands, the Rio Grande in New Mexico, the Colorado River watershed which will feed Boulder Dam reservoir in California and Idaho are described.

KRAEBEL, C. J. (2340)

FOREST COVER PROVED A CONTROLLING FACTOR IN FLOOD PREVENTION. U. S. Dept. Agr. Yearbook 1935: 202-206, illus. 1935.

Studies in erosion recently conducted by the Forest Service in California are described and results given. Floods in the Verdugo Creek watershed in Los Angeles County, after a severe forest fire had swept the mountain slopes, and the data on run-off and erosion are described and illustrated.

LAKE STATES FOREST EXPERIMENT STATION. (2341)

THE FOREST SITUATION IN THE CENTRAL PINE DISTRICT, MINNESOTA. Lake States Expt. Sta. Econ. Notes 3, 3 pp., illus. October 1935.

Contents: Early development; present conditions in the district (forest industries, present public forests, Indian forests, State forests); present forest land ownership; outlook for the future. Table 4 gives a general classification of land; table 5, area of forest land by forest cover types and condition classes; table 6, ownership of forest cover types and condition classes; table 7, area of State forests, 1935; table 8, area of forests under Federal control.

(2342)
INTERCEPTION OF RAINFALL BY THE FOREST. Lake States Forest Expt. Sta. Tech. Notes 14, 1 p. 1929.

Measurement made at two stations in northeastern Wisconsin in the spring and fall of 1928 indicate that forest cover prevents about 20 percent of the total rainfall from reaching the ground.

LAMB, F. H. (2343)

DENUDED LANDS OF WASHINGTON. Forester 4: 253-254. December 1898.

"In the interior of the State, lying between the Cascade Mountains on the east, and the Olympic Divide on the west, there is on the plains a forest of nearly pure fir, with areas of cedar, broken by many gravel prairies of thousands of acres in extent." The question as to whether these forests should be cleared for farm lands is considered. The writer contends that without the forests of Washington every rivulet in western Washington would,

during the floods of winter, become a raging torrent and overflow its bank, doing immense damage to the lands below. "It is best to keep western Washington in perpetual forest."

- LEFFERTS, W. (2344)
THE PRACTICAL VALUE OF FORESTS TO THE SURFACE OF THE COUNTRY. Forest Leaves 5: 58-62. August 1895.

Estimates America's thick-forest area at 3,500,000 square miles four centuries ago and says that nearly three-fourths of this territory has since been deforested. The importance of the varied functions performed by forests is pointed out.

- [LONG, A. P.] (2345)
AFFORESTATION OF WATER CATCHMENT AREAS. Engin. 142: 24-25. July 3, 1936.

Summary of paper presented before the British Waterworks Association, June 24, 1936, at Leeds. Among the points discussed are the influence of large forest tracts upon atmospheric humidity, survey of the area selected as a basis for its subdivision into plantable, unplantable, and agriculturally suited ground, and the choice of species and methods of planting.

- LONG, A. P. (2346)
HILL PLANTING. Quart. Jour. Forestry 31: 17-28. January 1937.

"The primary object of this paper is to consider some practical aspects of the afforestation of hill country . . . Improvement would appear to be possible in two directions namely, (1) a more intensive and improved agricultural utilization, and, (2) the adoption of other methods of utilization." Direct and indirect benefits derived from afforestation are outlined as one method in hill planting. Suitable tree species are recommended.

- LOWDERMILK, W. C. (2347)
FOREST INFLUENCES AND EROSION CONTROL. Jour. Forestry 34: 391-394. April 1936.

Report of the chairman of the committee on forest influences and erosion control of the Society of American Foresters, prepared for submittal at the Atlanta annual meeting, January 1936, but not presented. The author touches on significant events of the past year and recommends that a resolution be passed to favor the continued support of forest influence studies by the Forest Service, and erosion and flood control studies by the Soil Conservation Service, for selected drainage areas with special reference to the role of native vegetation and of land-use practices in erosion control and in streamflow.

- (2348)
FOREST LITTER AIDS IN CONSERVING WATER FOR CALIFORNIA FARMS. U. S. Dept. Agr. Yearbook 1928: 326-327. 1929.

This is a brief contribution on the relation of forest litter to soil erosion control. "The loss of litter layers as a result of forest fires or whatever other cause not only reduces the storable water but also leaves the soils exposed to excessive erosion, products of which are carried by the resultant high stages to silt up and destroy the storage capacity of flood-control reservoirs, or to cover and damage valley orchards and farm lands with sterile outwashed sands."

- (2349)
FORESTS AND SOIL CONSERVATION. Jour. Forestry 35: 198-204. February 1937.

Paper read at thirty-sixth annual meeting, Society of American Foresters, Portland, Oreg., December 16, 1936. Various movements are traced during the 250 years of American experience with soil erosion and its consequences, which culminated in the Soil Conservation Act of 1935 (Public, No. 46, 74th Cong.). Definition of the program of the Soil Conservation Service in its relationship to that of the Forest Service is given, with emphasis on coordination of attack on the erosion-control problem.

- (2350)
FORESTS AND STREAM FLOW. Jour. Forestry 31: 296-307, illus. March 1933.

"The Hoyt-Troxell report is an attack upon the widely accepted belief that watershed vegetation must be kept intact for the most favorable

influence upon stream flow and erosion and flood control, and, that the negative values of the vegetation, because of transpiration losses, are far outweighed by the beneficial effects. The Hoyt-Troxell report has had wide circulation; from several parts of the world we learn that it has misled engineers as to the value of watershed cover for the region in which the study was conducted. The conflicting evidence of various recent contributions emphasizes the importance of correctly evaluating the factors involved and that a complete algebraic summation must be made of all plus and minus factors to furnish the correct basis for watershed protection measures. Dr. Lowdermilk's careful analysis of the author's data and conclusions provokes and calls for further discussion of this report and of investigation of the subject in general by foresters and engineers."—Editor's note.

LOWDERMILK, W. C.

(2351)

FORESTRY IN DENUDED CHINA. *Ann. Amer. Acad. Polit. and Social Sci.* 152: 127-141, illus. November 1930.

Shows that the chief forestry problem of China is to control accelerated erosion on sloping land. Sketches the general features relating to the utilization of forests of the past in order to define principles for future methods. Local problems are discussed for south, central, and north China. Discusses specific methods of erosion control such as check dams, planting in the floors of gullies with willows and poplars, and the use of quick-growing vegetation.

(2352)

FURTHER STUDIES OF FACTORS AFFECTING SURFICIAL RUNOFF AND EROSION. *Internatl. Cong. Forestry Expt. Sta. Proc.* [Stockholm] pp. 606-628, illus. 1929.

"Extensive studies in northern and central China by the writer suggested the possibility of comparing quantitatively the influence of natural vegetation, chiefly forest vegetation, . . . with the denuded condition of adjacent slopes resulting from cultivation upon surficial run-off and erosion . . ."

(2353)

STUDIES IN THE ROLE OF FOREST VEGETATION IN EROSION CONTROL AND WATER CONSERVATION. *Fifth Pacific Sci. Cong.* [Canada] *Proc.* 5: 3963-3990, illus. 1933.

"Management of forested areas for water production, its control, and utility, have become of first importance in regions of multiple land use, and become the principal objective in semi-arid regions." The interdependence of vegetation and soil, accelerated erosion, an analysis of supply and disposition of meteoric waters are among the questions considered. Some experimental results to date, including experimentation in California, are described and illustrated.

—GORRIE, R. M., and AINSLIE, J. R.

(2354)

STUDIES IN THE ROLE OF FOREST VEGETATION IN EROSION CONTROL AND WATER CONSERVATION. *Empire Forestry Jour.* 14 (2): 340-346. December 1935.

"The future prosperity of a considerable proportion of the world's surface is primarily dependent upon the control of erosion and the conservation of water." The authors declare that before this can be fully effective several objectives must be attained: The actual problem must be understood; where it is already active, erosion must as far as possible be checked; and the initiation of new erosion must be obviated. Erosion problems in Nigeria are reviewed.

LUNDY, J. P.

(2355)

MAIN CAUSE OF DESTRUCTIVE FLOODS. *Forest Leaves* 2: 68-70. June-July 1889.

"So long ago as the time of the Greek philosopher, Plato, the destruction of hill and mountain forests was recommended as the main cause of destructive floods and torrents." The author quotes Alexander von Humboldt, considered the father of modern forestry, as saying: "The clearing of forests, the want of permanent springs, and the existence of torrents, are three phenomena closely connected together."

- McCARTHY, E. F. (2356)
FOREST COVER AS A FACTOR IN FLOOD CONTROL. Amer. Soc. Civ. Engin. Trans. 93 (Paper 1709): 716-723. 1929.
The author maintains that forest litter is the best protection against soil erosion and quotes in support thereof the findings of various Federal and State agencies.
- MacDONALD, G. B. (2357)
TESTS OF TREE SPECIES FOR PLANTING UNDER DIFFERENT SOIL, MOISTURE, AND CLIMATE CONDITIONS. Iowa Sta. Rept. p. 97, illus. 1932.
"The black locust is discussed with respect to its value in preventing erosion."—Expt. Sta. Rec. 69: 58. 1933.
- McGREE. (2358)
THE MISSISSIPPI BAD LANDS. Forester 3: 7. January 1897.
The author points out the effects of the industrial revolution in the early sixties. "So the cultivated acres were abandoned by thousands. Then the hills, no longer protected by the forest foliage, no longer bound by the forest roots, no longer guarded by the bark and brush dam of the careful overseer, were attacked by raindrops and rain-born rivulets and gullied and channelled in all directions . . ."
- McINTYRE, A. C. (2359)
TREES AND EROSION CONTROL. Amer. Soil Survey Assoc. (Ann. Rept. 15) Bull. 16: 110-114. May 1935.
Species of trees resulting in maximum benefit in the shortest time are discussed. "On denuded lands where advanced erosion is evident, nature must be aided . . ." Factors for consideration are climate and site; influence of insects, disease, animals; growth rate; aerial parts; forest litter and humus.
- McLEAN, J. E. (2360)
BLACK LOCUSTS FOR SOIL BUILDING AND POSTS. Prog. Farmer (Ga.-Ala. Ed.) 52: 18. January 1937.
- MADDOX, R. S. (2361)
CARE AND PROTECTION OF FORESTS. Resources Tenn. 5: 65-73, illus. April 1915.
"Land unfit for cultivation, and which should have been kept covered with trees, is a great contributor of soil to the floods of water that rush over it." Fire, run-off, and grazing are treated relative to forest preservation.
- (2362)
EROSION PROBLEM OF THE SOUTH AND ITS RELATION TO FORESTRY. South. Forestry Cong. Proc. pp. 62-71. July 11-15. 1916.
The writer cites Tennessee as typical of erosion problems and reviews conditions in various sections of the State. "We must look for the causes of erosion to the clearing of timberland. Causes of erosion can also be traced to forest fires." In discussing reclamation of the lands he says: "At every point erosion touches forestry. Its results and causes, as have been seen, are forestry issues, and attacking the problem means the regeneration of many acres for permanent tree growth."
- (2363)
RECLAMATION WORK A VITAL FORESTRY PROBLEM. Amer. Forestry 26: 74-76, illus. February 1920.
The increasing scarcity of lumber and its high cost are discussed. The author says that this situation "has been greatly augmented by the methods employed in handling our once forested lands . . . lack of proper conservation." Conservation work on waste areas and results, in eastern Tennessee are described. Photographs of gullied and wastelands before and after treatment are presented.
- (2364)
RECLAIMING GULLIED LANDS IN WEST TENNESSEE. South. Lumberman 80: 113-114, illus. December 25, 1915.
This article is the result of a geological survey made of gullied lands. Black locust, poplar, walnut, sycamore, Bermuda grass, and honeysuckle are recommended for gully planting after brush dams have made the foun-

duction. "It is a pretty safe guarantee that if a man carries out a scheme by which he restores his waste land, he will then have such understanding of the work and of the character of the soil that he can and will prevent it from wasting again . . . Thousands of acres of such land are primarily agricultural, by which is meant, land that can be readily perpetuated for growing crops, that under proper treatment will grow crops for all times."

MADDOX, R. S. (2365)

WEST TENNESSEE GULLIED LANDS AND THEIR RECLAMATION. Resources Tenn. 5 (1) : 8-22, illus. 1915.

"This article deals with an area of more or less eroded and gullied lands lying in a belt extending in a northeast and southwest direction through the State, . . . the author recommends the planting in gullies of such quickly-growing and widely-rooting trees as the black locust, yellow poplar, black walnut, and sycamore, and such crops as Japan clover, wild honey-suckle, and Bermuda grass . . ."—Expt. Sta. Rec. 33 : 392. 1915.

MAŘAN, BOHUSLAV. (2366)

INFLUENCE OF THE FOREST ON THE STATE AND RUN-OFF OF WATER. Lesnická Práce 3 : 139-155, 1926. [Reviewed by S. A. Wilde in Jour. Forestry 28 : 760-762. May 1930.]

Attributes the 1918-23 floods in Bohemia to the destruction of spruce stands by the nun moth and gives an analysis of observations made on the extent of floods in streams having denuded watersheds, as compared with stream flow in forested areas having about the same precipitation, geological conditions, and size and form of watershed.

MATTOON, W. R. (2367)

MEASUREMENTS OF THE EFFECTS OF FOREST COVER UPON THE CONSERVATION OF SNOW WATERS. Forest Quart. 7 (3) : 245-248. 1909.

"The author reports observations made on the progress of snowfall and subsequent melting in a virgin stand of western yellow pine in northern Arizona, and on an adjacent treeless park covering an area of several square miles. The observations, included the measurements of each successive snowfall and the total depth of snow at intervals of 7 days . . ."—Expt. Sta. Rec. 21 : 638. 1909.

MATTOON, WILBUR R. (2368)

FORESTRY AND FARM INCOME. U. S. Dept. Agr. Farmers' Bull. 1117, 33 pp., illus. 1920.

The advantages and methods of forest conservation are described.

(2369)

MAKING WOODLANDS PROFITABLE IN THE SOUTHERN STATES. U. S. Dept. Agr. Farmers' Bull. 1071, 38 pp., illus. 1920.

This bulletin shows the relation of forest conservation to soil-erosion control. The author stresses the importance of forestry in reclaiming gullies.

MAXWELL, G. H. (2370)

NATURE'S STORAGE RESERVOIRS. Forester 5 : 183-185. August 1899.

The writer maintained that protection of forests and foliage on mountain sides for the preservation of natural storage reservoirs was necessary. "The preservation of our forests means not only the preservation of water supplies for irrigation in the West; it means the preservation of water supplies throughout the whole country for power, for navigation, and for all the manifold needs for which the waters of the Eastern streams and rivers are used."

MEEHAN, T. (2371)

MOUNT DESERT AND THE EFFECT OF THE DENUDATION OF TREES. Forest Leaves 3 : 158-179. December 1892.

The geological history of Mount Desert Island, Maine, and its hilltops ranging from 300 to 1,500 feet above sea level, now barren mainly from fires, is given. "First, these hills are anything but everlasting. In the granite there is often much feldspar, which, on exposure to air and moisture, crumbles to powder. Then there is iron—and this oxidizes, rusts, and the hard rock, on exposure soon crumbles." Black spruce grows rapidly in this soil.

MEGINNIS, H. G.

(2372)

INFLUENCE OF FOREST LITTER ON SURFACE RUN-OFF AND SOIL EROSION. Amer. Soil Survey Assoc. (Rept. Ann. Meeting 15), Bull. 18: 115-118. May 1935.

Experiments conducted in Marshall County, Miss., are described and results given in tabular form.

(2373)

TREE PLANTING TO RECLAIM GULLIED LANDS IN THE SOUTH. Jour. Forestry 31: 649-656. October 1933.

It is pointed out that tree planting in the United States has always held a preeminent place in public thought over other forestry measures but in actual practice has lagged far behind. The author recommends national attention on forestation measures as a means of utilizing idle and unproductive areas.

MILLER, F. A.

(2374)

INFLUENCE OF DEFORESTATION ALONG THE WABASH RIVER. Ind. State Bd. Forestry Ann. Rept. 8: 17-47, illus. 1908.

Discusses the various ways in which the forest may exert a modifying influence on stream flow and soil erosion. Land erosion along streams is divided into two classes (1) that which affects the river banks, and (2) that which affects hills and slopes which form the river valley. Different treatment is recommended for each.

MILLER, JOAQUIN.

(2375)

WASHING AWAY THE LAND FOR WANT OF FORESTS. Forest Leaves No. 6, p. 35. February 1888.

This address was read before the American Forestry Congress in September 1887. He says in part: "I believe it is pretty generally conceded that our continent is being washed into the sea by way of the Mississippi and its thousands of miles of tributaries, on the one hand, and at the same time swept naked of its native forests by annual fires, on the other." He warns of danger from deforestation.

MOORE, W. L.

(2376)

FORESTS AND FLOODS. Amer. Mercury 11: 257-263, illus. July 1927.

The author contends that forests are the effect and not the cause of rainfall, and that floods are not caused by cultivation. "Only the size of the continents and the height and trend of their mountain ranges affect rainfall, not forests or other surface covering . . . Forests should be protected by the state, but not for themselves alone, and not because of any supposed beneficial influence on climate or floods." The impounding of flood waters is advocated; a comprehensive plan for the control of the rivers and floods of this continent should be worked out instead of wasting public money in protecting bush lots.

(2377)

THE INFLUENCE OF FORESTS ON CLIMATE AND FLOODS. Engin. News 63: 245-247. March 3, 1910.

In studies for the conservation of national natural resources the author, from a meteorological viewpoint, takes issue with the generally accepted findings that forests control stream flow, both in high- and low-water stages. "It is my purpose to present facts and figures that do not support these views . . . The fact that dead forests stand long after the streams have receded seems to prove that they are the last to disappear rather than the first, and therefore that their removal did not precede the drought but rather that the forests ceased to exist when the rainfall became deficient."

MORTON, J. N.

(2378)

CORRELATING FOREST PRACTICES. Pa. Dept. Forests and Waters Serv. Letter 7 (13): 1-2; (14): 2-3; (15): 2-3. 1936.

This paper was prepared for presentation at the Society of American Foresters on February 28, 1936. Constructive recommendations that will correlate forest practices as they apply to timber production, recreation, and wildlife management are given.

MULFORD, FURMAN LLOYD. (2379)

TREES FOR ROADSIDE PLANTING. U. S. Dept. Agr. Farmers' Bull. 1482, 50 pp., illus. 1928.

This bulletin describes the kinds of trees adapted to different parts of the United States, 32 regions being considered. The study presents practical information on the adaptability of the trees.

MUNGER, T. T. (2380)

AVALANCHES AND FOREST COVER IN THE NORTHERN CASCADES. U. S. Forest Serv. Cir. 173, 12 pp., illus. 1911.

Types of avalanches are discussed, and a study of the regions is presented. Description of the nature of slope slides and their relation to forest cover is given, the Berne and Wellington slides of 1910 being cited as examples.

MUNNS, E. N. (2381)

THE LESSON FROM SAVOY. Forest Worker 3: 15-16. July 1927.

The Department of Savoy in southern France is said to be more subject to sudden floods than any other locality in the world. This acute problem, together with destructive landslides, has been met by systematic reforestation as the only practicable flood-control measure of permanent value, superseding many years' use of levees.

—, AND SIMS, I. H., COMPILERS. (2382)

FORESTS IN FLOOD CONTROL; SUPPLEMENTAL REPORT TO THE COMMITTEE ON FLOOD CONTROL, HOUSE OF REPRESENTATIVES, SEVENTY-FOURTH CONGRESS, SECOND SESSION, ON H. R. 12517 TO PROVIDE FOR A PERMANENT SYSTEM OF FLOOD CONTROL, AND FOR OTHER PURPOSES. U. S. Forest Serv., 70 pp. 1936.

A presentation of the various aspects of forests in relation to flood control. The relation of private and Federal ownership to watershed conditions, the program for adequate watershed protection, and methods of meeting management requirements on private land are discussed.

NEW JERSEY BOARD OF AGRICULTURE. (2383)

ABSTRACT OF DR. J. T. ROTHROCK'S LECTURE ON RELATIONS OF FORESTS TO THE SURFACE OF THE COUNTRY. N. J. State Bd. Agr. Ann. Rept. 23: 179-181. 1895.

It is pointed out, among many other reasons for forest conservation, that "there is furthermore, an important relation of the forests to agriculture; every particle of soil upon our highlands is slowly moving toward the tide-water. It is merely a matter of time before the productive fertility of our hillsides will have taken its place in some stream, and be on its way to the ocean. This tendency we counteract by the use of fertilizers. The forests on higher grounds may be regarded as important factors in breaking up rock and furnishing decaying vegetable matter to restore the fertility which has been washed out of our fields, and whilst they do this they, themselves, are seldom much gullied or washed . . ."

NICHOLSON, J. W. (2384)

THE INFLUENCE OF FORESTS ON CLIMATE AND WATER SUPPLY IN KENYA. Kenya Colony Forest Dept. Pamphlet 2, 40 pp. 1929.

The extent of the influence exerted by forests on climate is dealt with. "Individual and communal action must supplement the State's efforts by the establishment of windbreaks and the maintenance or creation of forest cover along stream banks." The writer thinks that the majority of forests exercise a regional influence on climate. Forests and rainfall, forests and streamflow, and forests and wind are discussed with reference to a paper by Raphael Zon (2467) and one by C. E. P. Brooks entitled "The influence of Forests on Rainfall and Run-off (3036)."

FEARSON, G. A. (2385)

WHY THE PRAIRIES ARE TREELESS. Jour. Forestry 34: 405-508. April 1936.

A review and interpretation of the conclusions presented by Heinrich Walter in his book, entitled, "Ist die Prairie von Natur aus Baumlos?" "Among the many reasons that have been advanced in explanation of the absence of trees on the prairies are: the presence of salts inimical to tree growth; lack of typical forest soil organisms; dry summer winds; cold winters; deficient precipitation; and finally, that forests once occupied the prairies but were destroyed by fire and have been unable to return."

- PERRY, A. A. (2386)
BALD PEAKS RE-CLOTHED WITH TREES. *Farmer Mag.* 34: 6, 15, illus. February 1937.
How soil erosion was checked on hilltops in Peel County, Ontario, by tree planting.
- PETERS, J. G. (2387)
FOREST CONSERVATION FOR STATES IN THE SOUTHERN PINE REGION. U. S. Dept. Agr. Bull. 364, 13 pp. 1916.
The removal of pine and hardwood forests without proper provision for restocking the cut-over areas, and the destruction by fire of young trees and other vegetation on watersheds of important rivers has often resulted in increased soil erosion, the silting up of stream channels, and floods. This bulletin offers a solution for these problems.
- PINCHOT, GIFFORD. (2388)
BILLION TONS OF SOIL WASHED AWAY ANNUALLY. *Save Our Soil* 1: 2. March 1937.
The author calls attention to the Ohio flood and declares that the restoration of forests and vegetative covering is a major factor in flood control and soil conservation.
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- (2389)
THE CONSERVATION OF NATURAL RESOURCES. U. S. Dept. Agr. Farmers' Bull. 327, 12 pp. 1908.
The author discusses the national resources of the United States, the importance of forest resources and reforestation, and the relation of soil waste to deforestation.
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- (2390)
FORESTS AND EROSION. *Forester* 7: 48. February 1901.
Quotes Vice President-elect Theodore Roosevelt: "The forest is a great sponge for absorbing and distilling water. It is the great preventor of erosion, and erosion is always the danger point in any irrigation system."
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- (2391)
TREES AND CIVILIZATION. *Forester* 7: 175-178. July 1901. [Reprinted from *World's Work*. July 1901.]
The author presents his views on questions concerning national-forest reserves and their uses, the relation of forestry to mining, grazing, irrigation, water supply, and the forest policy of the Government.
- PRATT, J. H. (2392)
THE THIRD INTERNATIONAL POWER CONFERENCE AND ITS RELATION TO FORESTRY. *Amer. Forests* 42: 472-473. October 1936.
Summary of addresses given by Stuart Chase on Planning for Natural Resources in America, and by T. W. Norcross on Toward Stability in Our Natural Resources, at a meeting held in Washington, September 7-12, 1936.
- PRESTON, J. F. (2393)
FORESTRY AND SOIL CONSERVATION. *Amer. Forests* 43: 394-396, 409, illus. August 1937.
A description of the aims of the Soil Conservation Service in its reforestation program.
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- (2394)
FORESTRY IN SOIL CONSERVATION; THE FORESTERS' NEW OPPORTUNITY. *Jour. Forestry* 35: 205-209. February 1937. [Also in *Forestry News Digest*, pp. 22-24. February 1937.]
Paper presented at the thirty-sixth annual meeting, Society of American Foresters, Portland, Oreg., December 16, 1936. "The theme of this paper is that the soil conservation movement must have forestry as its chief ally. Forestry must replace other forms of land use on the steep and critically eroded land of the United States."
- RAMSEY, GUY R. (2395)
TREES TO CONTROL SOIL EROSION ON IOWA FARMS. *Iowa Agr. Col. Ext. Cir.* 223. 12 pp., illus. 1936.
Practical information on gully control and methods of planting on sheet-eroded areas.

- RANDALL, C. E. (2396)
LAND USE AND FORESTRY. *Nation's Agr.* 12: 3-4, 10, illus. May 1937.
The author outlines the objectives and program of the Forest Service, pointing out the effect of forestry, private and public, on soil conservation. Windbreak planting under the Clarke-McNary law is commented upon.
- RANDELL, J. E. (2397)
FORESTS AND FLOOD CONTROL (PUBLIC RESPONSIBILITY IN GROWING TIMBER). South. Forestry Cong., New Orleans. *Proc.* 11: 132-136. 1929.
"The influence of forests in retarding run-off and thus diminishing the destructive power of floods, and the value of forests in binding soils and preventing erosion have resulted in many forest areas in civilized nations being established as protection forests and placed under public control." The history of China's floods and famines may be traced to deforestation.
- REDENBACHER, O. C. (2398)
DEFORESTATION AND EROSION. *Purdue Agr.* 22: 39. November 1927.
The author states that the chief cause of erosion is the injudicious clearing, for cultivation, of land on which a forest cover should always have been maintained and estimates the soil losses in various sections of the United States. Nation-wide education is urged as a necessary step.
- RICHARDS, E. C. M. (2399)
FORESTRY AND FLOODS IN THE TENNESSEE VALLEY. *Amer. Forests* 42: 500-504, 530, illus. November 1936.
What the T. V. A. is doing in its united attack by engineers, agriculturists, and foresters on the water-flow control problem, and actual development of best techniques for stopping erosion through reforestation are discussed. Mentions the importance of the opportunity for the demonstration and development of forestry knowledge as it relates to control of run-off water and soil-erosion prevention presented by the creation of Norris Lake Forest consisting of 117,000 acres.
- FORESTRY IN THE TVA. *Engin. News-Rec.* 118: 344. March 4, 1937. (2400)
This is a discussion of an article in the December 24, 1936, issue, entitled "River and Region", in which the writer attempts more clearly to distinguish the problem of handling the land now in forest and the separate and distinct problem of stopping erosion on the nonagricultural lands which are not in forests. "There are at least 3,000,000 acres of such land, largely in small scattered areas."
- RICHARDSON, ARTHUR HERBERT. (2401)
REFORESTATION AND WATER RESOURCES. *Jour. Amer. Waterworks Assoc.* 28: 1051-1061, illus. August 1936. [Also in *Forestry chron.* 12: 274-284, 1936.]
"All agree that the forest does play an important part in connection with water resources and in this article an attempt will be made to show how this part can be strengthened by the wise use of existing forests on watershed areas and especially by the reforesting of new ones."
- RILEY, C. G. (2402)
A TRAGEDY OF THE BACKWOODS. *Nature Mag.* 10: 317-319, illus. November 1927.
"This poignant story of what happens when the forest is stripped from the land and no longer able to do its duty as the father of fertility is written and illustrated by C. G. Riley of Yale University School of Forestry."—Editor's Note.
- ROSS, N. M. (2403)
THE ROLE OF TREES IN MODIFYING THE AGRICULTURE OF THE DRY AREAS OF THE PRAIRIE PROVINCES. *Sci. Agr.* 16: 226-269. January 1936.
This paper was read before a joint session of the Western Canadian Society of Agronomy and the soils group and engineering group of the Canadian Society of Technical Agriculturists at the University of Alberta, Edmonton, June 26, 1935. The author states in his conclusions: "We do not make any extravagant claims as to what shelter-belts will accomplish nor do we consider that the planting of trees alone will provide a solution to the soil drifting and drought problem..." Not examined.

ROTHROCK, J. T.

(2404)

THE BLACK WILLOW (*SALIX NIGRA* MARSH) AS A PROTECTOR OF RIVER BANKS. Pa. Dept. Forestry, pp. 136-137, illus. 1901-2.

An example is given of protection and restoration of soil by black-willow plantings.

(2405)

FIRE AND FLOOD. Forest Leaves 5: 8-9, illus. February 1895.

The author states that forest fires are the main cause of forest-restoration prevention. Floods are a natural consequence. In discussing the legitimate removal of mature timber he says: "The blunder is when the aftermath of sprouts is left unprotected. These, unharmed by fire, and growing from well-established, vigorous roots, would speedily reach tree dimensions, and we should then have, not only the moisture-holding, flood-retaining capacity of the woody growth, but the timber as well." Cost of flood damages to bridges in Pennsylvania is mentioned.

(2406)

RELATION OF FORESTS TO THE FARMER. Pa. Dept. Agr. Ann. Rept. 2: 382-386. 1896.

The history of the earth is given with the causes and development of forests from lichens, or rock moss. The function of forests in retaining moisture and preventing soil washing is treated. "In a single day a tilled field may lose from its surface more soil than would be taken from it in a century of its forest state." The State law encouraging forest culture and imposing penalties for injury and destruction of forests, is discussed.

(2407)

WILLOWS ALONG THE BANKS OF OUR RIVERS. Forest Leaves 5: 66-67. October 1895.

The recuperative power of willows from floods or ice jams is pointed out.

RUMMELL, L. L.

(2408)

FORESTRY AND FLOOD CONTROL. Ohio Farmer 179: 8. June 19, 1937.

Attributes the severity of modern floods to denudation of hillsides and removal of vegetation and recommends erosion-control measures. Comments on the work at the Miami and the Muskingum projects in Ohio.

RUPP, A. E.

(2409)

CHOOSING THE RIGHT TREE. Soil Conserv. 2: 52-53, illus. September 1936.

"... afforestation appears to be the most feasible means of restoring soil productivity, through the process of building up organic matter. The correct determination of species and cultural practices is basic to successful afforestation."

RUZICKA, C. H.

(2410)

FORESTRY STUDIES AT THE WILLISTON SUBSTATION. N. Dak. Agr. Expt. Sta. Bull. 158: 100-102. 1922.

"Among several native and introduced tree species, the behavior of which is briefly commented upon in this report, the Russian olive, golden willow, Canadian poplar, Black Hills spruce, American elm, green ash, and box elder have proved hardy and drought resistant."—Expt. Sta. Rec. 48: 239. 1922.

SCHEIFELE, O. S.

(2411)

PROTECTION OF RIVER BANKS AND LEVEES. Canad. Engin. 54: 119-123, illus. January 10, 1928.

Describes the use of angular submerged willow tree planting to stop erosion and sliding of earth banks of rivers, canals, lakes, levees, cuts and fills, and for general flood control. Projects to effectuate these measures in Canada and the United States are described.

SCHUYLER, J. D.

(2412)

THE INFLUENCE OF FORESTS UPON STORAGE RESERVOIRS. Forester 5: 285-288. December 1899.

The writer discusses some conditions essential to the maintenance of stream flow and water conservation. The maintenance of vegetation on

slopes is described as most important. Conservation work of the Austrian and Swiss Governments is outlined; the author concludes that similar methods would be beneficial in California.

- SEBRING, H. M. (2413)
CHECKING FIRES PROTECTS SOIL. *South. Agr.* 67: 16, illus. March 1937.

This article tends to show the value of the forest litter and vegetation in erosion and flood control. Experiments at the Statesville, N. C., experiment station on vegetation and water run-off are analyzed.

- SECREST, EDMUND (2414)
SOIL EROSION AND TREE PLANTING. *Ohio Agr. Expt. Sta. Bimonthly Bull.* 18: 31, illus. March-April 1933.

"Experiments in various regions of Ohio demonstrate that gullied lands can be reclaimed by plantations of forest trees . . . The checking of soil erosion is accomplished not so much by the roots of the trees as by the accumulation of needle [pine] litter which falls from the trees . . ." which increases the absorptive capacity of the soil and sheds the surplus run-off without soil loss. Various species of trees which have proved best for reclamation are named.

- SHARPE, C. F. S. (2415)
"BRUSHING OUT" THE BANKS OF STREAMS. *Soil Conserv.* 2: 221-224, illus. April 1937.

The author warns against the clearing or "brushing out" of flood channels. He cites an experiment of a farmer in the eastern part of Spartanburg County, S. C., who decided that the land bordering a small stream flowing through his property would be improved if there were fewer trees along the banks to shade his crops and interfere with cultivation.

- SHEPARD, W. (2416)
FORESTS AND FLOODS. *U. S. Dept. Agr. Cir.* 19, 24 pp., illus. 1928.

"Frankly admitting that forests are but one of the many influences affecting the flow of streams, the author discusses in detail the effect of forests on run-off and erosion, taking up such subjects as the forest as a soil and water holder, deforestation and erosion, effect of deforestation on large rivers, aspects of the problem in different sections of the Mississippi River watershed and a suggested forestry program for this area. The well-kept forest is conceded to be an effective water and soil holder, the leaf litter and humus absorbing in the aggregate vast quantities of water. Forests also retard the melting of snow and delay and prevent run off."—*Expt. Sta. Rec.* 58: 744. 1928.

- SHERMAN, E. A. (2417)
PROTECTION FORESTS OF THE MISSISSIPPI RIVER WATERSHED AND THEIR PART IN FLOOD PREVENTION. *U. S. Dept. Agr. Cir.* 37, 49 pp., illus. 1928.

This circular presents the findings of a study conducted by the Forest Service to determine the relation of forests and forest lands of the Mississippi watershed to the flood problem. Considerable data on soil erosion are given.

- , COMPILER. (2418)
RELATION OF FORESTRY TO THE CONTROL OF FLOODS IN THE MISSISSIPPI VALLEY. *U. S. Cong. 70th, 2d sess., House Doc.* 573, 740 pp., illus. 1929.

Contents: Protection Forests of the Mississippi River Watershed and Their Part in Flood Prevention, by E. A. Sherman; Forest and Flood Relationships in the Mississippi River Watershed, by E. N. Munns; Forests as a Factor in Flood Control Within the Upper Mississippi River Basin, by Raphael Zon; Forest Conditions Within the Ohio River Watershed, by E. F. McCarthy; Forest Conditions Within the Lower Mississippi River Basin, by E. L. Demmon; Watershed Conditions Within the Missouri River Basin, by M. H. Wolff; Forest Conditions Within the Arkansas-White River Basin, by W. W. Ashe; Forest Conditions Within the Red River-Ouachita Basin, by E. L. Demmon. The remainder of the volume consists of appendixes.

SILCOX, F. A.

(2419)

FORESTRY IN FLOOD PREVENTION. Conservation 2: 4. June 1936.

Forest cover as an important issue in watershed areas for the prevention of floods is discussed. That part of the coordinated program of erosion stream-flow research and erosion control, established by the United States Department of Agriculture, which has to do with forest, range, and wild lands, is assigned to the Forest Service. This Service "has for years been studying watershed conservation, principally on forest and range lands . . . and has the data, the knowledge, the experience . . . to carry out this part of the national program to help prevent floods on the sources of critical watershed."

SIMMONS, J. R.

(2420)

PLANTING WHITE WILLOWS TO CHECK EROSION. Amer. Forests and Forest Life 32: 283-284, illus. May 1926.

The author presents a practical method of protecting earth banks by "angular submerged tree planting." Experiments in Canada along railroad embankments and shores are described.

SKEELS, F. E.

(2421)

"WORTHLESS LAND" AND FOREST DESTRUCTION. Forester 7: 20-21. January 1901.

Certain clauses of the general tax law of 1893 are pointed out in relation to the author's observation of deserted farms in decay. "If we trace up the original owners and enquire as to the cause of these apparent failures we find in almost every case that ordinary farm crops and the hardier fruits were successfully grown until some large tract of timber was cut that had stood near enough to afford a wind break." Conversion of barren, swampy, or worthless lands into forested areas is advocated.

SMYTHIES, E. A.

(2422)

AFFORESTATION OF RAVINE LANDS IN THE ETAWAH DISTRICT, UNITED PROVINCES. Indian Forest Rec. 7, pt. 8, 33 pp., illus. 1920.

"This note has been written to describe work carried out during this past six years by the Forest Department on a more than experimental scale, in afforesting waste lands of a peculiar but widespread type . . . The afforestation of ravine tracts in the Etawah District was a compromise between three schemes: (1) ravine reclamation, to prevent further erosion, (2) the creation of fuel and fodder reserves for the local villages, (3) a financial scheme for obtaining a profitable return from waste lands." The results to date are excellent and promising.

SOCIETY OF AMERICAN FORESTERS.

(2423)

PROCEEDINGS OF 33D ANNUAL MEETING IN MILWAUKEE, WIS., DECEMBER 1933. Jour. Forestry 32: 127-266. February 1934.

Subjects discussed at this meeting were: Suggestions for the Solution of the Forest Tax Problem, by F. R. Fairchild; The Lumber Code and Conservation, by Robert B. Goodman; Major Proposals of the Copeland Report, by E. H. Clapp; Whither Forestry, by A. Gaskill; Forward Not Backward, by F. A. Silcox; The President's Emergency Conservation Work, by E. W. Tinker; The Future Forest Land Acquisition Policy of the Federal Government, by L. F. Kneipp.

SOUTHERN FORESTRY CONGRESS.

(2424)

REPORT OF THIRD SOUTHERN FORESTRY CONGRESS, JULY 20-22, 1921. 209 pp. (Atlanta, Ga.) 1921.

The main headings under which material in this report appear are as follows; Organizations and Methods for Forest Protection, by B. H. Stone; What Forest Co-operation in Forest Fire Protection Means to Georgia, by J. G. Peters; Railroad Co-operation in Forest Fire Protection, by F. W. Beasley; The Farm Forest as a Public Asset, by A. M. Soule; Forest Resources and Opportunities in Georgia and other Southern States, by W. B. Greeley; Private Forestry, by J. K. Johnson; The Future of Cut-over Lands in Missouri, by F. Dunlap; Effect of Erosion and Relation to Land Use, by H. H. Bennett; Selling the Forestry Idea, by H. A. Reynolds; We Must Have Forestry, by R. S. Maddox; A Forest Experiment Station in the Southern Appalachians, by E. H. Frothingham; Reforestation in the South Atlantic and Gulf States and Some Brief Observations, by C. S. Ucker.

- SOUTHERN FORESTRY EXPERIMENT STATION. (2425)
 EROSION—STREAMFLOW. South. Forestry Expt. Sta. Ann. Rept. 12: 21-25.
 1933. [Mimeographed.]

Reports the results of investigations to determine the place of forests in erosion control and in the regulation of stream flow. Planting studies are described.

- STARRING, C. C. (2426)
 TREES TO CONTROL EROSION. Mont. Farmer 24: 3, illus. March 1, 1937.

Emphasis is placed on the advantages of single hedge rows.

- STEBBING, E. P. (2427)
 THE INFLUENCE OF FOREST ON RAINFALL, EROSION AND INUNDATION. Contemporary Rev. 141: 359-366. March 1932.

"So far back as 1475 the subject attracted the attention of the famous Venetian Council of Ten, by which a law was passed . . . regulating in great detail the clearance of the forests on *terra firma*. The mountain forests especially were protected by judicious and careful regulations which were renewed from time to time down to the very year of the extinction of the old republics. Tuscany and the Pontifical Governments were equally provident." The evil effects of deforestation in India and in Ceylon are discussed. "This destruction of forest for the growth of crops has been carried out [in Ceylon] in the past in a haphazard manner and has been followed by erosion on a great scale, with silting up of rivers and periodic flooding of the low country and destruction of arable land and property." It is pointed out that small scrub forests have as beneficial effects on the local countryside as have the heaviest of the great timber forests. Well-authenticated cases in India are quoted. Reference is made to various recent works on the influence of forests on rainfall, erosion, etc. A pamphlet published by the Kenya Forest Department on this subject is discussed in detail. The writer asserts that this question is yearly assuming a greater importance and demanding the closest attention and study.

- STEVENS, J. C. (2428)
 EFFECT OF FORESTS ON RUN-OFF. Jour. Elect. 32: 49-51, 73-75, 93-95, 116-117, 135-137, 166-167, 190-191, illus. 1913.

A series of articles in which the effect of forests on run-off is described. The author leads up to the conclusion that they do not exercise any appreciable influence upon stream flow and that where it does exist in slight degree it may in some cases be beneficial, and in others harmful.

- STEVENSON, D. D. (2429)
 CHINA'S TREES OF THE FUTURE. Amer. Forests 43: 347-349, 366-367, illus. July 1937.

This is a report of a general survey of the interior of Kwangtung, China, a region which offers great possibilities for practical results from a program of land conservation. Mention is made of the destructive effects of erosion and the need for reforestation on the hillsides to suit local conditions. It is suggested that where the soil is especially barren and in need of building up, legumes such as ipil-ipil (*Leucaena glauca*), a fast-growing leguminous tree successfully established on the hillsides of Luzon in the Philippines, should be tried.

- STICKEL, P. W. (2430)
 RELATION OF FORESTS TO THE EVAPORATING POWER OF THE AIR. Jour. New Eng. Waterworks Assoc. 47: 229-238, illus. September 1933.

"It is the purpose of this paper to show that forests, because of their modifying influence upon the factors which bring about water loss in the form of evaporation from the soil, have a very important role in any system of watershed protection . . . Practically no comprehensive data have been presented showing the influence of forests upon the evaporating power of the air, a factor which may serve as a fairly reliable index to the relative loss of water evaporated from the surface of the ground. The data included in this paper show how markedly the presence of the forest canopy modifies this factor." A description of forest areas and instrumentation, and an account of the effect of forest cover upon water loss from duff and soil follow: In his summary the author states: "In this paper no attempt has

been made to evaluate all influences which bring about differences in water losses within forests as compared to the open; sole consideration has been given to the influence of forests upon only one of many interrelated factors—the evaporating power of the air.”

STNY, JOSEF. (2431)

NEUERES SCHRIFTEN ÜBER BODENABSCHWEMMUNG UND DIE WALD-WASSER-FRAGE. Wiener Allg. Forst u. Jagd Ztg. 54 (25) : 112. June 19, 1936.

An article by Jan Stejskal in Bratislavy, on the value of forest cover (more especially pine trees) for holding water is reviewed. From observations made after heavy rainstorms he found that, although the water washed the forest floor clean, it left pools of water and in the spring various moisture-loving plants sprang up, such as *Juncus* and even peat moss. J. Schmid, however, in a book subtitled “Klima, Boden und Baumgestalt”, thinks the opposite. The reviewer states that all these observations and opinions are more or less local, that is, dependent on certain conditions, and he suggests that it would be well if young foresters and experiment stations would undertake research work to decide definitely whether forest cover increases moisture conservation and erosion control or hinders it. Many articles by American authors on the same question are briefly reviewed.

SWINGLE, C. F. (2432)

EXPERIMENTS IN PROPAGATING SHIPMAST LOCUST. Jour. Forestry 35: 713-720, illus. August 1937.

Experiments undertaken by the Soil Conservation Service nurseries, Arlington Experiment Farm, Rosslyn, Va., are described. “Shipmast locust produces few or no seeds. Consequently the tree must be propagated by vegetative methods.” A comprehensive study of this subject showed that shipmast and other locust may feasibly be propagated by root cuttings.

TAMESIS, FLORENCIO, AND SULIT, CARLOS. (2433)

REFORESTATION AND FLOOD CONTROL. Makiling Echo 16: 80-97. April 1937.

Soil and water conservation in the Philippines. Bibliography, pages 95-97.

THARP, W. E. (2434)

THE EFFECT OF FORESTS UPON THE EROSIVITY OF THE SOILS IN SOUTHEASTERN IOWA. Cent. States Forestry Cong. Proc. 1: 88-93, illus. 1930.

“Forests make little contribution of organic matter to the soils. This change or degradation of the soil with respect to organic matter, increases the erosivity. As previously stated this increased liability to surface washing is not apparent as long as the forest occupies the ground, for the tree roots and surface litter are decidedly effective in holding the soil in place even on strong slopes. It is only when the land has been cleared, the leafy debris dissipated and the meagre store of humus in the first few inches of soil has disappeared under tillage, that this feeble resistance to the run off waters becomes manifest.”

THORNE, D. W., AND WALKER, R. H. (2435)

THE INFLUENCE OF SEED INOCULATION UPON THE GROWTH OF BLACK LOCUST SEEDLINGS. Jour. Amer. Soc. Agron. 28: 28-34, illus. January 1936.

The author describes the black locust as growing best on well-drained, neutral soils and states that it has been recommended for planting from the New England States south to Georgia and west to Texas, Missouri, and Illinois. Experiments in isolation and study of black locust root-nodule bacteria, and inoculation in field trials at three nurseries in Ames, Iowa, are given with tables.

TOPHAM, P., AND TOWNSEND, R. G. R. (2436)

FORESTRY AND SOIL CONSERVATION IN NYASALAND. Oxford Univ. Imp. Forestry Inst. (paper 5), 21 pp., illus. 1937. [Mimeographed.]

Summary: “Notes of three lectures by P. Topham give a general account of forest conditions and policy in Nyasaland, and those of a lecture by R. G. R. Townsend describe the development of a communal forest scheme for the establishment of village forest areas. An appendix contains a memorandum, by the Native Welfare Committee, on Land Control and Development indicating the need for cooperative measures by all Government Departments concerned for soil conservation and the improvement of agricultural methods.” Not examined.

TOUMEX, J. W. (2437)

EFFECT OF DECIDUOUS AND CONIFEROUS FORESTS ON RAINFALL AND RUNOFF.
Jour. New England Waterworks Assoc. 40: 40-43. March 1926.

"Many efforts have been made during the past century to study rainfall on denuded areas and rainfall on forested areas . . . The results obtained by some of the investigators appear to show that the forest increases rainfall, often as much as 40 or more percent. The results obtained by other investigators . . . indicate that the forest does not increase precipitation . . ." The author recommends that the drainage area which feeds a reservoir be kept in forest, preferably coniferous, for the purpose of distributing the water crop over a longer period following precipitation.

(2438)

THE RELATION OF FORESTS TO STREAM FLOW. U. S. Dept. Agr. Yearbook 1903: 279-288. 1904.

Tells what the various factors entering into the problem of forests and stream flow are, and states some of the more important facts that observations in southern California have revealed. "In conclusion, it may be said that . . . its [the forests] economic importance in regulating the flow of streams is beyond computation. The great indirect value of the forest is the effect which it has in preventing wind and water erosion . . ."

UNION OF SOUTH AFRICA DEPARTMENT OF AGRICULTURE AND FORESTRY. (2439)

FORESTS IN RELATION TO CLIMATE, WATER CONSERVATION, AND EROSION. Union So. Africa Dept. Agr. Bull. 159, 62 pp., illus. 1935.

This bulletin is divided into five parts. Part 1 discusses forests and climate; part 2, forests and water conservation; part 3, erosion (in which gully, veld denudation, and control measures are considered); part 4, veld burning; and part 5, conclusions.

UNITED STATES DEPARTMENT OF AGRICULTURE. (2440)

RELATION OF FORESTRY TO THE CONTROL OF FLOODS IN THE MISSISSIPPI VALLEY. 70th Cong., 2d sess., House Doc. 573, 740 pp., illus. Washington, Govt. Print. Off. 1929.

Discusses forests in relation to erosion and stream flow, pages 9-14. A forest with a good understory of brush and a deep layer of humus is undoubtedly the best conservator of soil. Forests are not the only safeguards against erosion. Any vegetative cover has a tendency to retard run-off and check erosion. In the study of the relation of forests to stream flow, an important fact to keep in mind is the wide difference between the total precipitation and total run-off of any watershed.

UNITED STATES FOREST SERVICE. (2441)

A NATIONAL PLEA FOR AMERICAN FORESTRY. 73d Cong., 1st sess., S. Doc. 12, 2 v. 1933.

Watershed and Other Services and Products of Forests, v. 1, pp. 298-461; A Watershed Protection Program, v. 2, pp. 1509-1536.

(2442)

REPORT . . . 1936. 60 pp. Washington, Govt. Print. Off. 1936.

This report contains sections on land-use planning in the Forest Service, pages 1-3. Forest and range influences, pages 56-57. "Common sense calls for a systematic study of our lands, determination of the types of service for which they are most useful, and the formulation of practicable measures for obtaining these services, both now and continuingly."

(2443)

APPALACHIAN FOREST EXPERIMENT STATION.
STREAMFLOW AND EROSION. Appalachian Forest Expt. Sta. Ann. Rept. 11: 18-21. 1931.

Description of preliminary and experimental studies on the influence of forest cover on stream flow and erosion.

(2444)

SOUTHERN FOREST EXPERIMENT STATION.
SIXTEENTH ANNUAL REPORT, JANUARY 1, 1936-DECEMBER 31, 1936. 43 pp. [1937]. [Mimeographed.]

Plans are announced for experimentation in the use of timber on watersheds and the regulation of stream flow to curb floods and soil erosion. "Many problems are involved in watershed protection. Clearly, measures

which will promote reestablishment of plant cover on the barren or sparsely vegetated areas . . . are of the first moment."

UNITED STATES SOIL CONSERVATION SERVICE.

(2445)

COMPLETED REFORESTATION PROJECTS IN NESHANIC WATERSHED AND CLINTON PT. ECW CAMP AREAS. Soil Conserv. News Letter 1 (17):2. July 15, 1936.

Presents in tabular form data concerning acreage and plantings on each project in the Neshanic watershed area.

(2446)

SEED COLLECTION OF WOODY PLANTS. U. S. Soil Conserv. Serv. Regional Off. (Salina, Kans.) 7, 26 pp., illus. May 1936. [Mimeographed.]

"The brief information contained in this leaflet will aid in the seed collecting work of the [erosion-control] Projects, and Camps." The work is divided into three parts—coniferous trees, deciduous trees, and shrubs and small trees.

VIGOUROUX, C.

(2447)

REBOISEMENT DES TERRES INCULTES OU ABANDONNÉES. Rev. Eaux et Forêts 74:339-344. April 1936.

The question of reforestation of uncultivated or abandoned lands by the State or by cooperative societies is considered. Long-term leases of land, to be reforested and cut every 30 years, are advocated.

VOORENDYK, J. J.

(2448)

PLANTING TREES FOR SPECIAL PURPOSES. Farming in So. Africa 10: 108-109. March 1935.

The author deals with veld conservation and states that the results of floodwater and wind "may be controlled to a certain extent by devoting attention to those factors which do indirectly affect soil erosion. The most important of these . . . are: (1) destruction of the vegetation by human and animal agency; (2) over-grazing; (3) veld fires, and (4) cultivation of the soil." He lists some of the more important indigenous trees and bushes which may be regarded as fodder plants, as well as trees recommended for permanent firebreaks, and others for the reclamation of gullies.

(2449)

TREES AS AN AGENCY IN PREVENTING SOIL EROSION. Farming in So. Africa 10:73-74. February 1935.

The general principles as to how vegetative growth prevents soil erosion are presented, and differentiation between regions is stressed. Some of the outstanding qualities of trees in preventing soil erosion are enumerated.

WARD, R. D. C.

(2450)

THE INFLUENCE OF FORESTS UPON CLIMATE. Pop. Sci. Monthly 82: 313-331. April 1913.

"A popular discussion of this subject based upon a review of the literature. Special attention is given to the relation between forests and rainfall, but consideration is also given to the value of forests as windbreaks; their influence upon temperature, humidity, and evaporation; in collecting moisture from clouds and fogs; upon hail and other storms; and upon water supply, erosion, and floods, . . ."—Expt. Sta. Rec. 29: 842. 1913.

WARREN, W. D. M.

(2451)

EFFECT OF FORESTS ON EROSION, FLOODS, CLIMATE, AND RAINFALL AND ON IRRIGATION EXPERIMENTS. Indian Forester 62: 414-417, illus. July 1936.

The effects of denudation are summarized. "The gradual disappearance of forests in several countries of the world today is so changing the climate and soil conditions, that the very existence of the people is threatened." Description is given of an interesting irrigation experiment recently initiated by the Government of Bihar and Orissa. "The aim of the Department is to improve the conditions of the forests under its control. These improvements are doubly attractive if, in addition to being good financial investments, they fit in with the Orissa Floods Committee's recommendations for lessening flood damage and erosion. Irrigation does this." Summary of lectures delivered at the Science College, Patna University.

- WEBER, M. F. (2452)
THE PRACTICAL VALUE OF FORESTS TO THE SURFACE OF THE COUNTRY. Forest Leaves 5: 41-44. June 1895.
A plea for preservation of forests. To support his plea the author cites such indirect benefits as the broad influence exercised by forests over the temperature of the air, their influence in breaking the force of destructive winds, the tendency of forests to increase rainfall, and their influence in improving the general fruitfulness of the country. "The well-kept forest floor, better than even the close sod of a meadow, prevents erosion and abrasion of the soil and the washing of soil and detritus into brooks and rivers."
- WEITZ, J. (2453)
AN AFFORESTATION PLAN FOR PALESTINE. Palestine and Middle East Econ. Mag. 8: 391-394, 390, illus. August 1937.
Suggests a government afforestation policy and discusses hill and sand-dune afforestation. The planting of two types of forests is urged, ordinary woodlands and carob plantations, for the hills, which, according to the author, "owing to the erosion of the slopes which has gone on for many centuries—ever since the Jews were exiled from Palestine—and to the continuous felling of fruit and forest trees without replanting" have been brought to their present bare and denuded state.
- WEST VIRGINIA ACADEMY OF SCIENCE. (2454)
EFFORTS TO PRESERVE THE FORESTS ALONG THE STREAMS OF THE MIDDLE ALLEGHENY MOUNTAINS. Forester 2: 48. March 1896.
The West Virginia Academy of Science submits its resolutions with reference to the protection of forests and headwater streams for cooperation with other academies of science, scientific and forestry associations, and individuals.
- WESTVELD, R. H. (2455)
TREE PLANTING FOR EROSION CONTROL. Mo. Agr. Col. Ext. Cir. 345, 7 pp., illus. 1936.
The author discusses selection of species and class of stock, site preparation, and protection.
- WHITLEY, C. A. (2456)
CHASMS OF EROSION AND FOREST DEFENSE. Amer. Forestry 23: 492-493, illus. August 1917.
Describes 200-foot chasms in the Piedmont and the Atlantic Coastal Plain. "The tree growth at the bottom of some of these gorges affords interesting data. Without doubt the trees have sprung from seed. The transfer of a tree or even a young sprout to this site is against all probabilities . . . In these redeposits of earth, and in a region of heavy rainfall, erosion is to be felt with greatest severity and unusual problems for the conservationists are afforded."
- WILBER, C. P. (2457)
THE STATE'S FORESTRY PROGRAM AND THE SOIL EROSION PROBLEM. N. J. Municipalities 13: 15-16, 28, illus. January 1936.
The need for reforestation on eroded lands of New Jersey and for reclamation of abandoned fields and idle brush lands is emphasized.
- WILBUR, R. L. (2458)
CONTINENTAL CONSERVATION. Rural Amer. 8: 12-14. November 1930.
The history of early settlement is reviewed by the writer. "Gradually, with the shifts and changes, and with the development of a more intelligent understanding of the fundamental problems, we have been acquiring new conceptions of continental conservation. Conservation does not mean the hoarding of natural resources for a hazy, indefinite future. It does, though, mean intelligent and thoughtful planning for every resource of our continent." Other resources are considered but with respect to trees the author says: "For the most part, trees were the greatest antagonists of the settler. Today we are conscious that trees are the only suitable plants for many of the thin-soiled areas that have been cultivated almost to their destruction."

WILLEY, D. A.

(2459)

FOREST DESTRUCTION AND EROSION OF ARABLE LANDS. *Sci. Amer.* 98: 372-373, illus. May 23, 1908.

"The work of the elements eroding or eating away the surface of the United States affords a study for the scientists which is of extreme interest and importance." The author discusses the destruction by water erosion of rivers, streams, rills and freshets, and floods. The writer points out that investigations by the United States Geological Survey and the Forest Service have proved beyond question that floods are largely due to the indiscriminate cutting of timber along the headwaters of the southern streams. Reafforestation work in France and Switzerland is cited.

WILSON, JAMES.

(2460)

WHAT FORESTRY MEANS TO THE UNITED STATES. *Forester* 5: 271-275, illus. December 1899.

An appeal by the Secretary of Agriculture to the American farmer asking for more intelligent forest conservation. Among the various benefits which may result from such a policy are listed as protection against winds, floods, and drought, and the continued production of wood. The various uses of small woods and wood lots are discussed.

WOOD, G. L.

(2461)

AUSTRALIAN FORESTS IN RELATION TO CLIMATE AND EROSION. *Aust. Forestry Jour.* 11: 131-138, illus. December 1928.

This paper, prepared for the third British Empire Forestry Conference, discusses the inconclusive nature of Australian evidence of climatic effects following deforestation, the effects of deforestation upon the conservation of rainfall as shown in stream flow and erosion and siltation effects following deforestation in southeast Australia. The author says: "There is an urgent necessity for more complete investigation of the dangers that threaten our water supplies. The very delicate inter-relation between forests on the catchments and the regulation of stream flow is a problem of prime importance . . ."

HILLS AND RILLS. *Gum Tree* 8: 21-25, illus. December 1925.

(2462)

The author deplors the folly of unrestricted deforestation and while recognizing the possibility of a timber famine in Australia, considers the maintenance of running streams, preservation of soil beds, mitigation of climate extremes, and the welfare of rural industries largely dependent on forests.

WOODS, J. B.

(2463)

WHERE ARE WE IN FOREST CONSERVATION? *Jour. Forestry* 34: 682-683. July 1936.

"If we accept the latest available statistics as satisfactory, we are at a point where the area supporting forest vegetation has been reduced from an original 940 million acres to approximately 615 millions." Article X of the Lumber Code and private forest management are discussed. The need is stressed for State legislation to make forest ownership more attractive.

WOOLSEY, T. S., JR., AND OTHERS.

(2464)

NEW ENGLAND FLOOD CONTROL. *Jour. Forestry* 28: 103-107. January 1930.

This is a preliminary report of a special committee of the New England section, Society of American Foresters, presented at a meeting at Hartford, Conn., January 31, 1929. Past flood and causes of the 1927 flood in New England are discussed. "Heavy cutting not only diminishes the capacity of the soil and humus to absorb moisture; it increases surface run-off and erosion because of the logging roads, skidding trails, and bare soil merely covered with weeds. For details on forests in relation to erosion and streamflow, see pages 7 to 13 of the U. S. Department of Agriculture Circular 37 (August 1928). Anyone who will study this report can picture what would have happened in New England had there been no forests at all."

ZIEGLER, E. A.

(2465)

FOREST RELATION TO FLOODS AND SOIL EROSION. Pa. Dept. Forests and Waters Serv. Letter 7 (43): 1-2; (44): 1-3. 1936.

Consideration of the influence of forest cover on moisture precipitation, evaporation, leaf transpiration, run-off, and soil erosion is presented in two parts. Reforestation measures are also presented. The author says: "No human measures will prevent floods. They may have their destructive peaks reduced and somewhat controlled through (a) Engineering works, storage reservoirs particularly, and dykes. (b) The restoration of a complete forest canopy, and particularly a soil protecting forest litter and humus on every acre not needed by agriculture, industry and homes. (c) A general improvement of agricultural methods of farm management, specifically directed to the prevention of soil erosion . . ."

ZON, R.

(2466)

DO FORESTS PREVENT FLOODS? Amer. Forests 33: 387-392, 432, illus. July 1927.

The author presents the pros and cons of forest destruction as a cause of floods, referring particularly to the Mississippi Valley flood of 1927. "The forests themselves could not have held back these raging waters, but without forest management there can be no rational river management. The engineer and the forester must work hand in hand. It has long been recognized in the older countries that the secret of permanent flood control lies at the source rather than the mouth of mountain streams." Afforestation and engineering work in the northern Alps, Japan, and France are reviewed.

(2467)

FORESTS AND WATER IN THE LIGHT OF SCIENTIFIC INVESTIGATION. (Appendix to Final Report of National Waterways Commission, 1912.) U. S. Forest Serv. 106 pp. 1927.

"Of all the direct influences of the forest the influence upon the supply of water in streams and upon the regularity of their flow is the most important in human economy. This paper aims to bring together impartially all the well-established scientific facts in regard to the relation of forests to water supply." This report contains 36 pages of bibliography on the relation of forests to water and climate.

(2468)

NATIONAL ECONOMIC AND SOCIAL OBJECTIVES IN FOREST POLICY. Natl. Cong. on Land Utilization Proc. 1931: 77-83. 1931.

"The essence of a forest policy may be reduced to five principal objectives: (1) A sufficient and permanent supply of forest products and forest by-products; (2) protection of watersheds needed for regulation of stream flow and prevention of soil erosion; (3) preservation of forests for aesthetic enjoyment and recreation; (4) preservation of forests for the propagation and maintenance of wild life; and (5) utilization of wild lands not otherwise usable." The author enlarges on these objectives and concludes: "The benefits to agriculture from such a conservation program are self-evident . . ."

(2469)

THE RELATION OF FORESTS IN THE ATLANTIC PLAIN TO HUMIDITY OF THE CENTRAL STATES AND THE PRAIRIE REGION. Soc. Amer. Foresters Proc. 8: 139-153. 1913.

States that from the earliest times there existed among laymen, and even scientists, a belief that forests exercised an influence upon the climate of entire countries. "With the introduction of accurate methods of meteorological observations, this popular conception has seemingly been greatly discredited. Within recent years . . . many new facts came up independently in different countries, which point strongly to the possibility of the forest exerting a potent influence upon the humidity of regions lying far away from it." In the conclusion of his study the author states: "Forests must be protected not so much in localities which already suffer from lack of moisture as in regions which lie in the path of prevailing winds and are still abundantly supplied with ground water and precipitation."

ZON, R.

(2470)

WOODLANDS AS A CONTROL FOR FLOODS. *Canad. Forest and Outdoors* 33: 102. April 1937.

Findings of the Lake States Forest Experiment Station help to indicate the part taken by cleared pastures and ungrazed wood lots in preventing run-off and erosion on steep slopes. Results of measurements on three small watersheds are presented. The total amount of soil washed away from May to November was found to be 600 pounds per acre for cleared pasture, 1,600 pounds for grazed, wooded watershed, and 17 pounds for ungrazed, timbered watershed.

GULLIES

ANONYMOUS.

(2471)

BLASTING GULLY BANKS FOR EROSION CONTROL. *Ag-Ex News* 3: 6-8, illus. January 1934.

The use of explosives for gully-bank grading and straightening out channels "proved that in explosives the erosion engineer had acquired a faster, cheaper, and more efficient worker than ever before . . ." Details and results of the first demonstration in Mississippi are quoted direct from the superintendent's report.

(2472)

BUSINESS FARMERS' CALENDAR—GULLIES. *Prog. Farmer* (Ga.-Ala. Ed.) 38: 1133, illus. December 27, 1923.

Damage to tilled land by gullies is stressed. Detailed instructions for repairing such gullies by terracing and brush dams are given.

(2473)

FARM ROADS. Reedy Creek Farm Coop. 3 (3): 6-7, illus. March 1936. [Mimeographed.]

Shows two methods of constructing farm-haul roads to prevent gullies. Road types illustrated by drawings.

(2474)

THE FARM'S MOST VITAL PROBLEM. *Farm Machin. and Equip.* p. 13. August 15, 1936.

Discusses need for erosion control in an interview with L. G. Livingston, manager of the Du Pont agricultural extension section. Livingston is quoted as saying that in control of gullies with almost vertical sides "blasting the top sides of the banks to throw fertile topsoil into the gully has proved to be the most effective method of procedure. For this reason, explosives are playing a highly important part in the country's erosion-control program."

(2475)

GENERAL POLICIES OF GULLY CONTROL IN THE SALT CREEK WATERSHED. *The Land, Today and Tomorrow* 1: 16-17. October 1934.

This article recommends gully-control methods for use on three different classes of land—cropland, pasture land, and land to be reforested.

(2476)

GULLIES AND HILLSIDE WASHES. *Rural New-Yorker* 76: 934. August 4, 1917.

The main cause of gullies has not been stated. "Gullies and washes are formed by the action of water running over the surface of the ground. The soil is always underlaid by a hardpan or tough material, where the washes and gullies are evident . . . The cheapest and most profitable method I have tried for the prevention of washes and gullies is subsoiling by the use of dynamite."

(2477)

HEALING THE GULLIES. *Natl. Nature News* 1: 3, illus. April 5, 1937.

This paper suggests practical measures for gully control.

ANONYMOUS.

(2478)

LET NATURE HELP HEAL THE GULLIES! Okla. Farmer-Stockman 48: 5, 21.

February 1, 1935.

The story is told of a Pennsylvania farmer whose attempts to stop gullies by throwing in trash, cans, and old machinery resulted in failure. "The thought is to heal the gully—not to fill it." Bundles of cornstalk baffles were used, overlaid with Bermuda sod which prevented further gully cutting.

(2479)

RECOMMENDATIONS FOR GULLY-CONTROL WORK WITH EXPLOSIVES. Ag-Ex News 3: 10, illus. January 1934.

(2480)

SOIL EROSION. Farming in So. Africa 3: 694. April 1928.

Shows the need for preventive measures against the effects of heavy rainfall such as soil washing and the formation and enlargement of sluits and dongas (gullies). Reclamation of gullies is stressed.

ANTHONY, HAROLD G.

(2481)

GULLY CONTROL WORK WITHSTANDS TORRENTIAL DOWNPOURS. The land, Today and Tomorrow 2: 16, illus. 1935.

Check dams prove effective on the Hollery and Brewer farm, south of Minden, in northern Louisiana.

AYRES, Q. C.

(2482)

RECOMMENDATIONS FOR THE CONTROL AND RECLAMATION OF GULLIES. Iowa Engin. Expt. Sta. Bull. 121, 71 pp., illus. 1935.

"This bulletin deals with the various methods of gully control and reclamation by mechanical means. It is an attempt to capitalize the experience gained in planting a large number of dams of many different types in widely distributed parts of the State under the Federal Emergency Conservation program of 1933-34. In considering the detailed treatment presented one should not lose sight of the fact that gullies represent an advanced stage in erosion devastation and that the gully problem in all probability would not have developed had the land been rationally managed from the beginning."

BENTLEY, M. R.

(2483)

GULLY CONTROL. Tex. Agr. Col. Ext. Cir. C-49, 12 pp., illus. 1931.

For gully control the author advocates the soil-saving dam built of earth, the rock-wall dam, the concrete dam and drop, and the wooden stop-plank dam. "The best and cheapest means of stopping a gully is to build a terrace across it, and for that reason terraces should be used whenever practicable." Instructions for building dams are diagrammatically given.

BESLEY, F. W.

(2484)

TREE PLANTING OF GULLIES IN WATERSHED REFORESTATION. Pub. Works 64: 42-43. November 1933.

Evergreen rather than deciduous trees are recommended for watersheds, except in cases of badly gullied lands. "White pine requires good soil and moisture. Red pine will grow on drier sites." Along ridges and thin soils of upper slopes Scotch pine is advocated. Instructions for treating gullies are given.

BRINK, WELLINGTON.

(2485)

SOME CRACKING BIG GULLIES. Soil Conserv. 2: 283-284, illus. June 1937.

The author describes the work of the Soil Conservation Service in Stewart County, Ga. He points out the advantages of diversion ditches, terraces, terrace outlets, and vegetative cover such as kudzu, Bermuda grass, and black locust.

CALHOUN, F. H. H.

(2486)

GULLYING AND ITS PREVENTION. S. C. Agr. Expt. Sta. Cir. 20, 36 pp., illus. 1913.

"This circular contains popular discussion of the cause of erosion of farm lands, particularly through the agency of water, the necessity for its prevention, the means of checking the erosion, and the method of restoring eroded land to its original fertility . . ."—Expt. Sta. Rec. 30: 625. 1914.

- CLAYTON, E. S. (2487)
 GULLY EROSION; A SERIOUS MENACE TO FARMING AND GRAZING LAND. Agr. Gaz. N. S. Wales 46: 549-551, 609-612, 669-672, illus. 1935.
 "There are numerous instances of the serious damage caused by gully erosion to farming and grazing lands in Australia." Discusses the control of gullies, waterfall erosion, and the prevention of gullies by contour banks or furrows.
- COLLINS, D. R. (2488)
 PREVENTION OF GULLYING. Farm Engin. 3: 276. June 1916.
 Gully-control work on the Iowa State College farm.
- COLLINS, HENRY E. (2489)
 PLANTS OF PROMISE IN GULLY SLOPE PROTECTION. Soil Conserv. 1: 14-16, illus. November 1935.
 The Gila River watershed of Arizona is considered.
- EARGLE, D. HOYE. (2490)
 WHEN IS A GULLY STABLE? Soil Conserv. 2: 225-227, illus. April 1937.
 "In many of the older agricultural regions of eastern United States there are hillsides, now covered with a thick second growth of forest vegetation, which were once riddled with active gullies. While such gullies bear witness of destructive agricultural practices of the past, their activity has ceased and they are commonly regarded as stable."
- FAGER, G. E. (2491)
 STOP THE GULLIES. Amer. Fruit Grower 46: 7, 39, illus. April 1926.
 Discusses checking soil erosion in orchards by means of the Mangum terrace. Directions for laying out the terrace are given.
- FICK, J. C. (2492)
 ERODED AREA TURNED INTO LUCERNE LANDS. Farming in So. Africa 6: 389-390, illus. December 1931.
 Describes how a practical farmer converted a badly gullied area into productive land.
- FREEMYER, G. W. (2493)
 EROSION BRINGS MILLION DOLLAR LOSSES. Purdue Agr. 31: 76, 87, illus. March 1937.
 The author estimates the annual losses to the United States, in money, soil, and plant food and describes the nature of erosion, especially gullying. Directions for gully control are given, emphasizing the importance of various types of dams.
- HARMON, GEORGE L. (2494)
 HOW GULLIES ARE CONTROLLED BY VEGETATION IN SOUTH CAROLINA. Soil Conserv. 1: 12-13, illus. May 1936.
- HAZEN, L. E. (2495)
 OKLAHOMA FARMSTEAD. Okla. Agr. Expt. Sta. Cir. 74, 37 pp., illus. 1928.
 Pages 12-14 of this circular are concerned with erosion control. "The instant we strip the native vegetation from the surface there will occur many provoking little gullies on the slopes, and the loss of much surface soil." Bench, sod-ridge, and Mangum terraces are recommended.
- HICKOK, R. B. (2496)
 PREVENTING BARNYARD GULLIES. Soil Conserv. 1: 16, illus. September 1935.
 Describes the use of vegetation and loose-rock check dams in controlling farm-lot gullies.
- HOWARD, I. M. (2497)
 GRASS FOR GREEDY GULLIES. Farm and Ranch 55: 2, illus. December 1, 1936.
 Gully control in Oklahoma.
- IRELAND, H. A. (2498)
 ROTATION OF GULLY HEADS. Soil Conserv. 2: 228-229, 244, illus. April 1937.
 This article describes the success of a farmer in Spartanburg County, S. C., who tackled the erosion problem through "rotation of gully heads."

- LAKE STATES FOREST EXPERIMENT STATION. (2499)
 THE GROWTH OF A GULLY. Lake States Forest Expt. Sta. Tech. Notes 49, 1 p. December 1931.
 This paper describes the process of gully cutting in southeastern Wisconsin. "Gully formation is not a process by which the fertility and soil of a farm are slowly lost but is literally a cataclysm."
- LEBRON, L. C. (2500)
 GULLY BLASTING—A METHOD OF EROSION CONTROL. Explosives Engin. 12: 196-197, illus. July 1934.
- LEHMAN, E. W. (2501)
 CALLING A HALT ON GULLIES. Capper's Farmer 45: 20, illus. February 1934.
 Various ways of controlling and checking gullies are discussed.
- LENTZ, G. H. (2502)
 STOP GULLIES—SAVE YOUR FARM. South. Agr. 66: 8, illus. November 1936.
 A description of the work of the Soil Conservation Service in cooperation with the Civilian Conservation Corps in gully control.
- LIVINGSTON, L. F. (2503)
 BLASTING GULLY BANKS CONTRIBUTES TO BETTER GROWTH OF TREES AND OTHER VEGETATION ON BANKS AND BOTTOMS. E. I. DuPont de Nemours & Co. Agr. News Letter 4: 128-129. September 1936.
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- (2504)
 USE OF EXPLOSIVES IN GULLY-BANK BLASTING TO CONTROL EROSION AND PROTECT ADJACENT LAND. E. I. DuPont de Nemours & Co. Agr. News Letter 3: 16-18. August 1935.
- MCCLYMONDS, A. E. (2505)
 PLANT PROBLEMS IN CALIFORNIA GULLIES. The Land, Today and Tomorrow 2: 1-5, illus. February 1935.
 "While this article does not pretend to cover completely the place of plants in gully control, it has outlined the recommended methods of procedure with the plants of proven value as used in California. It is believed that the results of our work here on the Pacific Coast may be of interest to others, particularly those West of the Mississippi River, and it is with that thought in mind that this paper has been written."
- MACDONALD, A. B. (2506)
 LOST AT SEA. Country Gent. 89: 13, 30, illus. July 19, 1924.
 The author discusses acreage and cost of farm land annually washed down the gullies to the ocean. Experiments with the Adams soil-saving dam are cited.
- MARTIN, G. E. (2507)
 RECLAIMING AND CONTROLLING GULLIES AND DITCHES. Okla. Agr. Col. Ext. Cir. 219, 15 pp., illus. 1929.
 "Reclamation methods suggested here are offered as supplements to terracing, not as substitutes for terracing." Some of the work undertaken on the Guthrie, Okla., project is described.
- MATTERN, J. R. (2508)
 BLASTING TO CORRECT SOIL EROSION. Country Life 32: 132-136, illus. October 1917.
 The experience of a farmer in Montgomery County, Pa., in blasting the bottoms of gullies to break them up in such a way as to result in their filling again to the surrounding level. Details as to methods and results are given.
- MATTOON, W. R. (2509)
 FIGHTING GULLY EROSION. Amer. Forestry 22: 286-287, illus. May 1916.
 Soil erosion in western Tennessee has been brought to the attention of the public "by the widespread depreciation in value of farm lands." Gully reclamation work in Tennessee is described and illustrated.

MATTOON, W. R.

(2510)

STOP GULLIES—SAVE YOUR FARM. U. S. Dept. Agr. Farmers' Bull. 1737, 14 pp., illus. 1934.

"Comprised largely of illustrative material, this is designed to suggest effective and practical ways and means of checking gullies by establishing stands of trees, vines, and grasses as protective soil covers. The necessary steps in stopping gullies are said to be (1) construction of temporary check dams, (2) grading of abrupt banks to an angle of 30 percent or less, (3) planting of soil-retaining vegetation, and (4) protection of the vegetation from fire, livestock, and overcutting."—Expt. Sta. Rec. 72: 847. 1935.

MEGINNIS, H. G.

(2511)

USING SOIL BINDING PLANTS TO RECLAIM GULLIES IN THE SOUTH. U. S. Dept. Agr. Farmers' Bull. 1697, 18 pp., illus. 1933.

"Asserting that millions of acres throughout the uplands of the South are eroding at an appalling rate, the author discusses the planting of trees, vines, grasses, and other plants as a means of preventing erosion. The restoration of the forests is deemed the climax process for reclaiming areas denuded by gullying. However, the construction of brush barriers and the planting of rapidly-growing plants must usually precede actual reforestation."—Expt. Sta. Rec. 69: 59. 1933.

MOSES, D.

(2512)

CONTROLLING SLOOTS OR DONGAS. Farming in So. Africa 4: 273-274, 302. September 1929.

"It cannot be too strongly emphasized that South Africa is losing, annually, thousands of tons of soil which we cannot afford to lose." The author thinks that the farming of cultivated lands along sound lines, the introduction of scientific methods of pasture management, the filling up of dongas (gullies) by methods described in this article, and the planting of more trees will do much to reduce this loss, and are lines of action within the reach of most farmers.

OHIO AGRICULTURAL EXPERIMENT STATION.

(2513)

EROSION CONTROL. Ohio Agr. Expt. Sta. (Ann. Rept. 53) Bull. 548: 105, 108-110. 1935.

Emergency Conservation Work labor is being used on constructive work in soil-erosion control in southeastern and southern Ohio. Temporary structures for the control of gullies and the planting of trees on gullied areas to hold and protect the soil are included in the program. Statistics on work accomplished are given.

PENN, RAY E.

(2514)

POINTERS ON GULLY CONTROL IN MIDDLE WEST. Soil Conserv. 2: 11. July 1936.

Sixteen erosion-control measures are prescribed.

PURDUE, A. H.

(2515)

THE WASTE FROM HILLSIDE WASH. Resources of Tenn. 2: 250-254, illus. June 1912.

Discusses the formation of soil and the origin of gullies, advises the spreading of straw and the planting of raspberry and blackberry plantings on slopes subject to soil washing, and especially recommends terracing.

RAMSER, C. E.

(2516)

GULLIED LAND RECLAIMED BY THE USE OF BRUSH FOLLOWED BY TERRACING. U. S. Dept. Agr. Yearbook 1931: 279-281, illus. 1931.

Methods for the reclamation of gullies, and a description of a test at the Guthrie, Okla., experiment farm.

(2517)

GULLIES: HOW TO CONTROL AND RECLAIM THEM. U. S. Dept. Agr., Farmers Bull. 1234, 44 pp., illus. 1922.

"Popular information is given on gullies, their types, causes, occurrences, and results, and on the prevention and reclaiming of gullies by plowing in and seeding, tree planting, and the use of soil-saving dams."—Expt. Sta. Rec. 47: 19. 1922.

- REA, ROBERT (2518)
WILD PLUMS STOP A GULLY. *Capper's Farmer* 47: 43. March 1936.
In Washita County, Okla., an incipient gully was sowed with wild plum seed and was soon stopped by the spreading plum trees. One acre produced a 200-bushel crop in 1934, the year of western Oklahoma's worst drought.
- REDDICK, HARRY E. (2519)
THE CALIFORNIA BARRANCA. *Soil Conserv.* 2: 54-55. September 1936.
The author tells of the great loss of productive land around Las Posas, southern California, caused by the gullies (barrancas). These barrancas "have actually taken out of cultivation 775 acres of land with a total value exceeding \$775,000, and are certain to take soon, if not stopped, an additional 525 acres worth \$525,000.
- ROE, H. B. (2520)
CONTROL OF GULLIES. *Agr. Engin.* 15: 232. July 1934.
Instruction is given for the prevention and control of gullies. Soil-saving dams, sodded channels and barriers, and other measures are advocated.
- _____ (2521)
GULLIES CONTROLLED. *Wis. Agr. and Farmer* 61: 15. May 12, 1934.
Instructions on gully control by check dams, sod barriers, etc., are given.
- SHEPARD, J. L. (2522)
WE DAMMED OUR GULLIES WITH SOD. *Country Gent.* 106: 78. June 1936.
The author tells of his effective, yet cheap, method of stopping small gullies with sod barriers and suggests bags filled with bluegrass sod to prevent new washes in gullies.
- SISK, LEON J. (2523)
ALL THIS STARTED FROM THE TRICKLE FROM A ROOF. *Soil Conserv.* 1: 12-13, illus. September 1935.
How Georgia's largest gully was caused by the rain from the roof of a barn built in 1885, on the Patterson farm in Stewart County.
- SMITH, PAUL C. (2524)
EROSION FARM ENEMY NO. 1. *Bur. Farmer (Ill. Agr. Assoc. Sec.)* 9: 15-16, illus. March 1934.
Story of Providence Cave at Lumpkin, Ga., and how the chasm 150 feet deep and nearly 1 mile wide first started as a small gully in 1874 and eventually swallowed up buildings. Losses through soil washing are estimated and reclamation by the C. C. C. are discussed at length.
- STOCKWELL, H. J. (2525)
SOIL EROSION CONTROL WORK BY THE C. C. C. *Agr. Engin.* 16: 194, illus. May 1935.
Reclamation of gullies in Illinois was considered too costly, if not impossible, up to 1933 when Emergency Conservation Work was initiated. Through the C. C. C. valuable timber and grassland is protected, soil is kept on the hills, and silt out of the streams.
- TURNER, A. W. (2526)
RUBBISH NO GOOD IN DITCHES. *Farm Mechanics* 1: 17. September 1919.
The use of refuse to fill up ditches makes them larger. Rubbish should be dumped elsewhere because it does more harm than good in the control of soil erosion and gullies, is the opinion of a Shelby County, Iowa, farmer.
- UHLAND, R. E. (2527)
CHECKING GULLY EROSION ON GOLF COURSES. *U. S. Golf Assoc. Green Sec. Bull.* 12: 9-13, illus. January 1932.
Instructions are given on gully control by means of barriers made of burlap bags and woven-wire check dams. Tree plantings are suggested for gullies forming in soils which have soft substrata. Terracing the area above the course is recommended as a most effective control method.

UHLAND, R. E.

(2528)

THE USE OF BLUE GRASS IN THE CONTROL OF SOIL EROSION. U. S. Dept. Agr. Farmers' Bull. 1760, 13 pp., illus. 1936.

"The author has used bluegrass sod for barriers and vegetative cover in central Missouri for many years and has observed the use of bluegrass in various ways by a number of farmers in gully control. It has proved a highly effective and practical method of checking small washes in cultivated fields and in pastures where gullies have started in livestock paths . . . This bulletin . . . is designed to further familiarize farmers with the various ways in which bluegrass may be used as a means of gully control."

— AND WOOLEY, J. C.

(2529)

THE CONTROL OF GULLIES. Mo. Agr. Expt. Sta. Bull. 271, 24 pp., illus. 1929.

"Practical information is given on the causes of gullying in soils and on control measures . . ."—Expt. Sta. Rec. 62:78. 1930.

UNITED STATES SOIL CONSERVATION SERVICE.

(2530)

AN EXPERIENCE WITH BLACK LOCUSTS. Soil Conserv. 2:25, illus. August 1936.

Notes success with black locust plantings in control of gullies in Muskingum County, Ohio, and emphasizes value of black locust for fence posts.

UNITED STATES EROSION SERVICE.

(2531)

EROSION CONTROL HANDBOOK. 69 pp., illus. (Zanesville, Ohio.) 1934. [Mimeographed.]

"This handbook has been prepared . . . for the use of members of Camp Mangold and Camp McIntyre." Its purpose is to show the general plan and organization of the Salt Creek Watershed of the Soil Erosion Service to present information on gully-control methods which members of the camp may use as a guide. The methods outlined herein are presented as a framework upon which to build and increase knowledge of gully control."

WALKER, R. S.

(2532)

DEVIL OF A DITCH AND HOW PERKINS STOPPED IT. Market Growers Jour. 34:9. January 1924.

An insignificant little stream turned into a wide gully in 10 years. The farmer plowed it north and south after the winter rains were over, and planted blackberry bushes. Grass and brush took root, soil was formed, and in 5 years he could plant it to farm crops.

WHITSON, J.

(2533)

WHEN A GULLY GROWS INTO A DEEP DITCH. Wallaces' Farmer 56:908, illus. August 8, 1931.

The need of erosion control to stop the serious loss of fertile topsoil is stressed. A ditch or gully 25 to 35 feet deep in Fremont County, Iowa, and the progressive cause of it is described. Also refers to the "piecing out" of bluegrass pasture in southern Iowa with sweetclover.

WOOD, I. D.

(2534)

A FARM WASHED AWAY. Successful Farming 21:7, 20, illus. December 1922.

Recommends the use of soil and brush dams for gully control and gives directions for building them.

HOW MUCH LAND DO YOU LOSE EACH YEAR? Successful Farming 23:11, 35, illus. April 1925.

Practical hints on gully control by the use of different types of brush dams are given.

INEXPENSIVE METHODS OF GULLY CONTROL. Nebr. Agr. Col. Ext. Cir. 741, 16 pp., illus. 1933.

(2536)

"Methods of erosion control vary greatly, depending on soil conditions, location in the State, rainfall, topography, and the stage which the damage has reached. One of the first and most important steps in any program of erosion control consists of building up and maintaining the organic matter content of the soil by the use of legumes, manure, straw, and cornstalks." Methods of ditch control, such as plowing in and seeding, baffles, terracing, and soil-saving dams with a list of necessary materials are discussed.

- WOOD, I. D. (2537)
 STOPPING THE LARGE GULLY, A METHOD THAT SAVES BOTH LAND AND LABOR.
 Successful Farming 21: 5, 91, illus. October 1924.
 Gives instructions on the construction of permanent soil-saving dams for
 gully control. A drainage system in connection with the dams is described.
- ZOBELL, I. D., AND STEWART, GEORGE (2538)
 EROSION. Utah Agr. Expt. Sta. Bull. 225: 5-6, illus. 1931.
 Describes the chief causes of erosion in Carbon County, Utah, with par-
 ticular reference to gullies.

LAND-USE PLANNING AND SURVEYS FOR SOIL AND WATER CONSERVATION

- ANONYMOUS. (2539)
 AERIAL PHOTOGRAPHIC SURVEY OF THE NAVAJO AND ZUNI INDIAN RESERVATIONS
 OF ARIZONA, NEW MEXICO, AND UTAH. Science 79: 51, illus. January 19,
 1934.
 "The conservation and rehabilitation work to be done on these Indian
 lands has been made necessary by the progressive impoverishment and de-
 struction of the ranges by soil erosion following over-grazing."
- COMBATING THE NATION'S GREATEST ENEMY. Earth Mover 22: 24-26, illus.
 October 1935. (2540)
 Ninety-four new projects have been approved to supplement 47 projects
 already in operation, and these will give added momentum to the program
 of the Soil Conservation Service. The keynote of this Service is: "Effi-
 ciency, harmonious relations, and scientific methods, all working together
 for the common purpose of soil conservation through wise use of the land."
- CONTROL FOR SOIL CONSERVATION PROJECTS. Mil. Engin. 28: 152. March-
 April 1936. (2541)
 Announcement is made that the Coast and Geodetic Survey has been
 requested by the Soil Conservation Service to extend horizontal control
 surveys in four small areas, totaling approximately 21,800 square miles,
 in New Mexico, Arizona, and Wyoming, as required in producing maps
 to be compiled from air photographs.
- DETAILS OF EROSION CONTROL WORKED OUT FOR EIGHT STATES. Engin. News-Rec.
 115: 239. August 15, 1935. (2542)
 The States of Pennsylvania, Louisiana, Ohio, Minnesota, Maine, Ala-
 bama, Wisconsin, and New Jersey will have a complete land-use and land-
 treatment plan, demonstrating practical and effective measures of land
 protection and erosion control.
- EXPERIMENTS ON THE PREVENTION OF SOIL EROSION. Science 78: 526. Decem-
 ber 8, 1933. (2543)
 An experiment in land use, covering 2 million acres in 10 different re-
 gions, is described.
- IDEAS FOR REVISING SOIL PROGRAM. Wallaces' Farmer 62: 534. July 17, 1937. (2544)
 "If the present type of soil conservation program is continued in 1938,
 what changes and modifications would be desirable to those wishing to par-
 ticipate?" The A. A. A. put this question to State committees in the north-
 central region, of which Iowa is a part, and four general recommendations
 resulted for the State as a whole, namely (1) an increase in soil-building
 allowances for 1938; (2) "... the participating farmer would not need
 to meet fully the soil conserving goal in order to earn some payment, but
 he would need to have a soil conserving acreage of not less than 50 per cent
 of goal to start with"; (3) two types of payment, one for soil conserving and
 one for soil building; and (4) a special soil-building allowance for taking
 land unsuited to continued crop production out of the cropland bases.

ANONYMOUS.

(2545)

LAND PLANNING. (Editorial.) Gard. Chron. [London] 98: 257. October 12, 1935.

"Erosion in the wide sense of the word is at work no less in the temperate regions than in the sub-tropical and tropical parts of the world. The essential food materials of plants—nitrogenous and other—are continually being washed away . . . The menace threatens urban as well as country life." The destruction through overgrazing and burning of grasslands all over the British Empire, as well as forest felling and shifting cultivation which cause accelerated erosion, have made it clear that land planning should be made a work of research and study for the benefit of the whole world. For this purpose the establishment of an Agronomical Institute at Oxford is advocated: "The maintenance and enhancement of the fertility of the earth are problems that will only be solved when biological science as a whole is brought to bear on them."

(2546)

A LAND POLICY FOR THE NATION. (Editorial.) Fert. Rev. 10: 2-3, illus. July-August 1935.

The Government is actively developing a long-time land program and policy and in so doing the recommendations of the National Resources Board are being applied. These recommendations are given in their entirety.

(2547)

LARGE-SCALE DEMONSTRATIONS TO PREVENT SOIL EROSION. Fert. Rev. 8: 13. October, November, December 1933.

A brief survey is made of the Nation-wide effort to combat soil erosion through P. W. A. projects. The author sums up statements of H. H. Bennett. "Mr. Bennett has pointed out that already, so far as crop production is concerned, 35,000,000 acres of crop land have been completely destroyed by erosion. He (Mr. Bennett) estimates that 3,000,000,000 tons of soil are washed from our fields and pastures every year and the cost to farmers amounts to \$400,000,000 annually." Locations of P. W. A. demonstration projects are given.

(2548)

LOUISIANA SETS UP PLANNING BOARD. BOARD WILL DRAFT MASTER PLAN FOR DEVELOPMENT OF THE STATE AND WILL PASS ON ALL PUBLIC CONSTRUCTION. Engin. News-Rec. 117: 135. July 23, 1936.

Announcement is made of Louisiana's State Planning Commission, established at the last session of the legislature. The plan will cover such subjects as flood protection, forests, wildlife refuges, and drainage. The plan also includes the development of a comprehensive land-utilization program.

(2549)

NEW AGRICULTURAL PLAN FOR SOIL CONSERVATION AND NATIONAL FARM AID. Wis. Agr. and Farmer 63: 1, 6, illus. March 28, 1936.

Describes the Agricultural Adjustment Administration's soil conservation program for the current year. Soil-depleting, soil-conserving, and soil-building crops are listed, with an explanation of the cooperative program between landowners and the Federal agencies.

(2550)

NEW ORDER IN CONSERVATION; MUSKINGUM CONSERVANCY DISTRICT. (Editorial.) Amer. Forests 43: 337. July 1937.

"The Muskingum project is impressive both in its magnitude and its possibilities as a national proving ground of what can be accomplished by cooperative effort in readjusting land uses to benefit the social and economic life within a given drainage area. The Conservancy District embraces eighteen counties or about one-fifth the area of the State."

(2551)

PERMANENT BOARD FOR RESOURCES STUDY. Engin. News-Rec. 117: 98. July 16, 1936.

The statement is made that "the committee recommends further large-scale purchases of land by the Federal government for the protection of areas that cannot be made commercially profitable, further encouragement of zoning by states and counties, continuation of the soil conservation pro-

gram, and a re-study of reclamation problems by the Departments of the Interior and Agriculture." The committee asks that it be made a permanent organization and recommends the establishment of a land-use subcommittee.

(2552)

PLANNING TO PREVENT SOIL AND BEACH EROSION. Amer. City 50: 65, illus. August 1935.

Comment on a statement issued July 24, 1935, by the New Jersey State Planning Board. Describes measures taken to prevent beach erosion. "In the matter of soil erosion, generally, the Board says that only a reconnaissance survey of the extent of the damage is as yet available." A map defines the extent and locality of eroded areas.

(2553)

PRESIDENT PLANS LAND RECONSTRUCTION ON NATIONAL SCALE. Amer. Forests 40: 320, 322. July 1934.

"A rounded program of national scope covering development of the Nation's watersheds was visioned by the President in his message to Congress June 4 and June 8. The whole plan is suggestive of the Tennessee Valley experiment . . ." Referring to the Norris resolution and its comprehensive plan on flood control, navigation, irrigation, and development of hydroelectric power, the author quotes the President: "This broader definition brings to our attention very clearly such kindred problems as soil erosion, stream pollution, reforestation, afforestation . . ."

(2554)

RESOURCES COMMITTEE SUBMITS NATIONAL PUBLIC WORKS PROGRAM. Engin. News-Rec. 118: 240. February 11, 1937.

President Roosevelt recommends adoption of a standing 6-year public works plan, based on selection and priority of projects. "In a special message to Congress on Feb. 3, President Roosevelt . . . referred especially to a three-part program submitted by the National Resources Committee . . . The second part of the report deals with a nationwide investigation of drainage basins undertaken with a view toward determining the principal water problems in various areas and to present an integrated pattern of development and control designed to solve these problems . . ."

(2555)

SAVING THE NATION'S FARM LANDS: THE BIGGEST CONSERVATION PROGRAM. U. S. News 3: 5. April 1, 1935.

States that the proper use of land resources of the Nation was an outstanding objective of the relief program for 1936. The scope of the program with respect to land use and soil conservation is briefly outlined.

(2556)

THIRD PACIFIC NORTHWEST REGIONAL PLANNING CONFERENCE. Planning News 41 (1-2): 5-8. January-February 1936.

Contains summaries of reports of various committees. The report of a program and policies committee recommended, among other things, "the development of a well-defined Nation-wide land policy for the beneficial use of land and water resources and including proper recognition of reclamation . . . The agriculture and land classification sections of the Land Resources Division submitted recommendations as to: policies for resettling farmers now on marginal lands, including provisions for advice to settlers; the use and control of marginal and sub-marginal lands; continuation of cooperation in research on land problems, and land classification and land-use planning; the expediting of soil survey work; consideration of recreation in land planning; control of noxious weeds; public information in connection with land-planning activities."

(2557)

UPPER RIO GRANDE PROBLEM UNDER STUDY. Engin. News-Rec. 117: 331. September 3, 1936.

The organization of the Rio Grande joint investigation is headed by the National Resources Committee. Most of the work has been assigned to three Federal Bureaus—the Water Resources Branch of the United States Geological Survey, the Bureau of Agricultural Engineering, and the Bureau of Reclamation. In addition the Soil Conservation Service, the Resettlement

Administration, and the Indian Service are cooperating. "Water resources, present uses, and possible transmountain diversions are being investigated to lay the foundation for an interstate compact on water."

(2558)

WATER RESOURCES PROBLEM STUDIED BY STATE PLANNING BOARDS. Engin. News-Rec. 116: 165. January 30, 1936.

Under the heading "Water Resources Problems" many State boards point out that a program for conservation of water resources can be successful only when properly coordinated and interrelated with plans for land use, forestry, health, recreation, game management, agriculture, and soil erosion.

ALEXANDER, WILL W.

(2559)

RESETTLEMENT IN INDIANA. FEDERAL AGENCY SEEKS TO HELP FARMERS AND CONSERVE LAND RESOURCES. Ind. Farmer's Guide 92: 636-655, illus. December 5, 1936.

The Resettlement Administration "plans for correct land use and the rehabilitation of maladjusted farm families . . . A loan or a new homestead mean new life and new hope to thousands of Americans; and reforestation and erosion control mean new acres for generations to come."

ALLIN, B. W.

(2560)

IS PLANNING COMPATIBLE WITH DEMOCRACY? Amer. Jour. Sociology 42: 510-520. January 1937.

"Planning in a democracy is not the making of a blueprint, with specifications fixed for all time; it is a social process in which the participation of the layman is as important as that of the expert. This process is nowhere better illustrated than by the agricultural planning now being sponsored by the Agricultural Adjustment Administration, where agreement between farmer and expert opinion is an indispensable part of the planning procedure. One aspect of this planning relates to the problem of soil conservation. Here, as in most economic matters requiring the attention of the government, the most hopeful procedure for harmonizing public and private interests is the employment of collective persuasions and inducements democratically determined. These can be developed only by planning."

ALLRED, B. W.

(2561)

SCS PROJECTS STUDIED. FOUR-DAY TOUR IN SOUTHEASTERN COLORADO REVEALS SUCCESS OF SOIL-SAVING PROJECTS. West. Farm Life 38: 8. July 15, 1936.

Reports on work of projects as observed during a soil-conservation tour held June 15 to 18, beginning at the Pueblo project. Gives information concerning the system of pasture contour spreaders at Burn Mill project, water-penetration tests, contour-furrowed pasture lands, and an improvised grass seeder.

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

(2562)

PROCEEDINGS OF LAND USE SYMPOSIUM, SUMMER MEETING AT SYRACUSE, N. Y. 57 pp., illus. N. Y. State Col. Forestry. 1932.

Contents: The National Land Use Committees, by L. C. Gray; The Relation of Taxation to Land Utilization, by F. P. Weaver; Land Use and Forestry, by J. S. Illick; The Tax Problem, by M. Graves; Land Use and Agriculture, by J. C. Lipman; Land Use and Erosion, by H. G. Knight; Land Use and Transportation, by C. L. Raper; Planned Land Use, by L. R. Schoenmann.

BAKER, O. E.

(2563)

THE AGRICULTURE OF THE GREAT PLAINS REGION. Ann. Assoc. Amer. Geogr. 13: 109-167, illus. September 1923.

The author discusses boundaries and division lines, moisture belts, crops and pasture, livestock, agricultural productivity, size of farms, and systems of farming.

(2564)

A GRAPHIC SUMMARY OF PHYSICAL FEATURES AND LAND UTILIZATION IN THE UNITED STATES. U. S. Dept. Agr. Misc. Pub. 260, 57 pp., illus. 1937.

This publication is one of a series on graphic summaries of farm tenure, taxation value of farm property, farm mortgage debt, etc. Seventy maps show lands suitable and unsuitable for crops and pasture.

BAKER, O. E.

(2565)

LAND-USE CHANGES POINT TO LESSENING NEED OF EXPANSION. U. S. Dept. Agr. Yearbook 1927: 413-416, illus. 1928.

The years since the World War in the agricultural area are discussed with respect to the mechanization of agriculture, geographic shifts in production, and livestock changes by regions.

(2566)

LAND UTILIZATION. In *Encyclopaedia of Social Science*, v. 9, pp. 132-137. New York. 1933.

A survey of land utilization is presented. "It is evident that land utilization research has not only economic but also geographic and demographic aspects, . . ." Among the recommendations adopted by the National Conference on Land Utilization in 1931 is the following: "Steps should be taken to outline and initiate a program of soil conservation whereby damage from erosion, leaching, increasing acidity, destruction of organic matter, deterioration of soil structure, overgrazing, flooding, and alkali accumulation may be reduced to a minimum." Literature is cited.

(2567)

LAND UTILIZATION IN THE UNITED STATES; GEOGRAPHICAL ASPECTS OF THE PROBLEM. *Geogr. Rev.* 13: 1-26, illus. January 1923.

The author discusses the geographic and demographic aspects of agricultural productivity, land reclamation, the enlarged homestead law of 1909, the grazing homestead law of 1916, and national welfare as the basis of a national land policy. "A survey of the present and potential use of the land is one of our greatest national needs."

(2568)

OUTLOOK FOR LAND UTILIZATION. U. S. Dept. Agr. Ext. Cir. 168, 33 pp., illus. 1931. [Mimeographed.]

"The outlook for the utilization of agricultural land in the United States is affected primarily by four groups of factors: I. Extent of the land resources and rate of depletion; II. Technical progress in utilization of these resources and trends in agricultural production; III. Population trends, changes in diet, exports, and other factors that affect the consumption of farm products; IV. Land resources of foreign countries and competition by agricultural products from these countries, both in the United States and abroad." The author regards erosion as the third source of soil depletion, and the greatest. Figures on soil loss, from estimates by H. H. Bennett, are quoted. Conservation of the Nation's resources through grass and perennial legumes and the operation of machinery for improving lands are among the measures advocated.

(2569)

THE OUTLOOK FOR LAND UTILIZATION. *Nebr. State Bd. Agr. Rept.*, 1932: 153-179, illus. 1933.

The writer contends that in studying the land problem the first step is to consider the probable future need for farm land. "This is dependent upon the future consumption of farm products . . . and upon production by acre . . ." The prospect for consumption of farm products depends upon three factors—population growth in the United States, consumption per person, and net exports. Soil erosion and land resources are considered, pages 173-174.

(2570)

THREE TRENDS TO BE CONSIDERED IN RELATION TO A LAND USE PROGRAM. *Nebr. State Bd. Agr. Rept.* 1935: 153-174, illus. 1935.

"In considering a land use program it will be well to keep in mind the probable continuation of three trends: (1) Advances in agricultural technique; (2) Depletion of soil resources; (3) Decline in the birth rate." The author considers the situation with regard to all three. A map showing the general distribution of erosion is included.

BAKER, R. H., SITTERLEY, J. H., AND FALCONER, J. I.

(2571)

MAJOR LAND-USE PROBLEM AREAS AND LAND UTILIZATION IN OHIO, 1935. 98 pp., illus. March 1935. [Mimeographed.]

This preliminary report is in two parts and presents material assembled and coordinated from various sources. Part I is a presentation and discus-

sion of areas that seemed to show major land-use problems arising out of past and present use of land. Part II presents some of the significant physical, economic, and social factors related to land use.

BATES, C. G., AND ZEASMAN, O. R.

(2572)

SOIL EROSION—A LOCAL AND NATIONAL PROBLEM. Wis. Agr. Expt. Sta. Research Bull., 99, 100 pp., illus. 1930.

"This bulletin reports the results of an investigation of soil erosion made by the station in cooperation with the Lake States Forest Experiment Station of the U. S. D. A. Forest Service. The region studied embraces three counties in the unglaciated section of southwestern Wisconsin, and to a very small extent the Minnesota territory adjacent, in the vicinity of Winona . . ."—Expt. Sta. Rec. 64: 270. 1931.

BAVER, L. D.

(2573)

SOIL EROSION IN MISSOURI. Mo. Agr. Expt. Sta. Bull. 349, 66 pp., illus. 1935.

This bulletin describes and summarizes in detail the results of a soil-erosion survey of Missouri conducted by the Soil Erosion Service and the Department of Soils, University of Missouri, in 1934. "The results of the survey are shown in Map 1 and Tables 1 and 2. The different areas on the map indicate the distribution and extent of the erosion types within the State. The data in Table 1 are approximate acreage estimations of the different types of erosion. The data in Table 2 are estimates of the extent of erosion by counties . . ." Several maps are shown presenting data on lime requirements in pounds per acre, acres terraced, soil types in various areas; the average degree of slope of Missouri lands, etc.

BEAMON, W. F.

(2574)

MAKING A RECONNAISSANCE EROSION SURVEY MAP. The Land, Today and Tomorrow 2: 29-31. January 1935.

Describes the work of the drafting section of the Soil Erosion Service.

BEELER, M. N.

(2575)

LEVELING HILL FARMS. Capper's Farmer 45: 6-7, 19, illus. July 1934.

Over an entire watershed in three Kansas counties, a complete land-utilization program, including erosion control and water conservation, is being developed. Experimentation with machinery and methods of terracing and contour farming on the limestone Creek project are described, as are also cropping systems, dams, livestock production, and reforestation.

BENNETT, H. H.

(2576)

THE CLASSIFICATION OF FOREST AND FARM LANDS IN THE SOUTHERN STATES. Forestry Cong. Proc. 3: 69-113. July 20-22, 1921.

"The Soil Survey of the United States Department of Agriculture, co-operating with most of the States, is undertaking to show on maps the precise location of all the different kinds of soils, to define each type of soil, to explain its present economic use . . . The question of forestry adaptation has not been given the consideration that has been devoted to the adaptation problem of farm crops." The author comments on the need for further study of soil and plant relationships in connection with forest trees and plants. Data on areas of forest land and land of low farm value in the pine belt of the southern Coastal Plain are given.

(2577)

FACING THE EROSION PROBLEM. Science 81: 321-326. April 5, 1935.

An address before the American Association for the Advancement of Science, Pittsburgh, 1934. The author discusses the findings of the Nationwide reconnaissance erosion survey, conducted by the Soil Erosion Service, and stresses the need of greater soil conservation education. In describing control measures he points out that more than 2 million acres of land in Georgia alone have been destroyed for further crop use because of improper terracing. Practical control measures are listed as (1) various adaptations of thick-growing vegetation to practical farm operations, (2) use of engineering structures and mechanical procedures where applicable, and (3) retirement of steep, excessively erodible land from cultivation. The relation of soil conservation to flood control and silting is also discussed.

BENNETT, H. H.

(2578)

MANAGEMENT AND USE OF AGRICULTURAL LANDS INCLUDING FARM WOODS AND PASTURES. U. S. Soil Conserv. Serv. SCS-MP-13, 48 pp. Sept. 1936. [Mimeographed.]

A paper presented at the Upstream Engineering Conference, September 22 and 23, 1936. The author discusses the seriousness and extent of soil erosion in the United States and stresses the need for additional research work. The use of vegetation is particularly urged as a control measure. The author also discusses the relation of proper land use to flood control, the conservation of water by contour tillage and terracing, flood irrigation, conservation of water with small dams, and siltations. Considerable tabular data are given on the effects of land use on the average annual run-off and soil loss at experiment stations in various sections of the country.

(2579)

THE NATIONAL PROGRAM OF SOIL AND WATER CONSERVATION. Jour. Amer. Soc. Agron. 23: 357-371, illus. May 1931.

"The national program of soil and water conservation, with which this paper is concerned, relates primarily to the abnormal phase of soil erosion—that which results from the activities of man and his domestic animals in breaking down natural soil conditions and stabilizers through the complete or excessive removal of vegetation and the disruption or destruction of the normal or natural soil structure by cultivation, trampling, and other means." Methods of control are discussed, and the program is outlined. "It is proposed under the national program of soil and water conservation to determine the efficacy, practicability, and cost of all promising means relating to the prevention, control, and reduction of erosion and excessive runoff of rainwater, and to carry the results to those users of the land according to the specific needs and adaptabilities of their soils."

(2580)

RELATION OF THE SOIL SURVEY TO THE UTILIZATION OF SOUTHERN SOILS. Jour. Amer. Soc. Agron. 16: 421-428. July 1924.

The author discusses various soil types in different regions of the United States and their suitability for different crops. A plea is also made for better land usage to check soil erosion. Protective policies are outlined.

(2581)

STATE OF THE SOIL. Amer. Forests 40: 444-446, 502, illus. October 1934.

The author discusses land impoverishment in the Tennessee Valley "calling for control of erosion and a new concept of regional land use." The initial steps of early settlers are pointed out, together with their methods of cultivation of the various soils. The author says in part: "After all is said, it is erosion that constitutes the real American crisis in land use. The steps that inevitably must be taken to control the devastating agency of erosion, and the causative process of speeded-up run-off is the application of a coordinated land-use program, applied in accordance with the specific needs and adaptabilities of every acre of land within watershed areas."

(2582)

USING THE SOIL CORRECTLY. Farm Jour. 49: 10, 50, illus. December 1925.

A paper on the value of the United States Soil Survey and how it will help farmers avoid a recurrence of mistakes.

BESSEY, R. F.

(2583)

PROGRESS REPORT, 1934-35. 219 pp., illus. 1935. [Mimeographed.]

The report of the consultant of the Pacific Northwest Regional Planning Commission for 1934. It is intended to cover the progress and findings of the first year of the Pacific Northwest Regional Planning Commission. The report embodies (1) a description of the region, (2) the regional planning problem, (3) organization, (4) progress in various fields, (5) State planning, (6) local planning, (7) objectives, and (8) recommendations. Important data on soil erosion control are presented under Land Resources, page 48.

BLACK, J. D. (2584)

AGRICULTURAL REFORM IN THE UNITED STATES. 511 pp. New York, McGraw-Hill Co. 1929.

"The purpose of this book is to discuss the issues of agricultural reform as they are likely to come before the people of the United States in the next ten years. The data and facts which it presents are brought up to the minute; but they also reach back and furnish a basis for discerning the trends of the next decade . . . The book is in five parts: The first including a brief statement as to the present conditions of agriculture and the efforts made to improve it; the second, an analysis of the three kinds of surpluses; the third, an analysis of the proposals to raise prices of farm products by Government action; the fourth, a description of the other methods of attack on the problem; and last, a brief statement of the adjustments that are needed in production, land utilization, transportation, marketing, credit and taxation. Part I also outlines in a broad way the various alternatives of a national policy with respect to agriculture and the bases of these."

BOKE, RICHARD L. (2585)

LAGUNA INDIANS PIN THEIR HOPES TO BETTER LAND USE. Soil Conserv. 2: 199-200, illus. March 1937.

The author shows how the Soil Conservation Service, acting in cooperation with the Indian Service, is aiding the primitive people of the pueblo of Laguna on the Rio Grande to establish improved land-use policies.

BOND, W. E., AND SPILLERS, A. R. (2586)

USE OF LAND FOR FORESTS IN THE LOWER PIEDMONT REGION OF GEORGIA. South. Forestry Expt. Sta. Occas. Paper 53, 47 pp., illus. November 20, 1935.

The study reported in this paper was to determine, for the territory covered, the elements of a land-use program, based upon physical factors, present methods of utilization, and economic conditions which affect present and prospective utilization. The region, forest conditions, forest industries, financial possibilities of forest management in present stands, use of forests for soil protection, game management, and recreation and grazing are discussed. An appendix presents considerable data on different plantings for erosion control.

BONSER, H. J. (2587)

SOCIAL LIFE IN THE CROOKED CREEK AREA. Pa. Agr. Expt. Sta. Bull. 345, 29 pp., illus. 1937.

Descriptive summary of social aspects of a survey of 458 farms in 1935 by the Soil Conservation Service in locating a soil erosion control demonstration project.

BROOKS, BENJAMIN. (2588)

EROSION OF WATERSHEDS AND ITS PREVENTION. Jour. Amer. Water Works Assoc. 3: 409-414. June 1916.

The author gives specifications for the construction of the Mangum terrace and discusses the efforts of western and southern farmers in checking erosion. The suggestion is advanced that the Federal Government cooperate with the individual in solving the problem.

BROWN, P. E. (2589)

LAND AND LAND USE. Science 83: 337-343. April 10, 1936.

"It is time that something is done about soil conservation and proper land use if our security as a nation is to continue." Land inventory and classification, removal of submarginal land from production, protection and regulation of land use and industry, land use and taxation, are all parts of a program advocated. "We must have a land-use plan, and then we must have action."

(2590)

SOME PROBLEMS OF LAND USE IN THE CORN BELT. Jour. Amer. Soc. Agron. 28: 173-192, illus. March 1936.

This article points out the indifference of farmers to the dangers of soil erosion until awakened by depression conditions. The history of agricultural rehabilitation in the Corn Belt is sketched. "The primary problem is to determine the ratio of feed to grass and other crops which will most

effectively conserve land resources . . ." Maps, work sheets, cropping systems for soil fertility maintenance are presented and problems of soil erosion and prevention such as pasture, rotation, organic matter, liming, fertilizer, grassland, and education are discussed.

BUCHANAN, R. E. (2591)

RESEARCH IN IOWA IN SOIL EROSION, SOIL CONSERVATION AND RELATED LAND USE PLANNING. 47 pp. Iowa Agr. Expt. Sta. 1936. [Mimeographed.]

Describes the work and programs of the Iowa Agricultural Experiment Station in soil conservation. An account is given of research in various demonstration areas and soil-erosion farms.

BURRIER, A. S. (2592)

LAND USE PROBLEMS IN OREGON, AN ABRIDGED REPORT. 64 pp. Oreg. State Planning Bd. - 1935. [Mimeographed.]

Discusses the unproductiveness of Oregon's submarginal wheatlands, p. 13, and attributes the problem to lack of rainfall. The consequent factor of wind erosion is pointed out, and it is recommended that these lands be turned back to grazing.

CARR, M. E. (2593)

SOIL RESOURCES AND THEIR UTILIZATION. Pa. Dept. Agr. Bull. 169: 57-67, 1908.

Soil resources are regarded by the writer as a natural source of wealth and "without exception the greatest economic endowment of the American people . . ." The history of American soil with changes in utilization is given. Drainage of swamps and protection of farm land through deep plowing are stressed. "If we expect to receive adequate returns from the soil we must begin at the foundation and prepare a seed bed of sufficient depth and such condition of tilth as to furnish an ideal home for the growing plants which constitute the crop . . . We must reforest those soils which never should have been cleared and we must utilize the present forest products of the soil in the best possible way . . ." Education of children for the farm is recommended.

CARTER, W. T. (2594)

SOILS OF TEXAS. Tex. Agr. Expt. Sta. Bull. 431, 192 pp., illus. July 1931.

"Nearly 80 percent of Texas has been reached by some form of soil survey work." The author presents an analysis of soils and soil utilization for different sections of the State. "Erosion has injured much of the soils of this region, and the inherent productiveness has been greatly reduced in many places by this agency of soil destruction." The general character of native vegetation is discussed.

CENTRAL NORTHWEST REGIONAL PLANNING COMMISSION. (2595)

REPORT AND RECOMMENDATIONS OF CENTRAL NORTHWEST REGIONAL PLANNING COMMISSION ON GREAT PLAINS AREA PROBLEMS. 136 pp., illus. November 15, 1936.

Part I gives recommendations of the Central Northwest Regional Planning Commission to the National Resources Committee, and the Great Plains Drought Area Committee, and recommendations of various States to the Central Northwest Regional Planning Commission. Part II presents factual material on land use, soil conservation and erosion, water conservation, and forestry.

Bibliography, pages 133-136.

CHAMBER OF COMMERCE OF THE UNITED STATES, SPECIAL COMMITTEE ON LAND POLICY. (2596)

REPORT OF COMMITTEE. 42 pp. Washington. Nov. 1934.

Chapter titles: The Approach to a Sound Land Policy; Land Classification; Adjustment of Agricultural Production to Demand; Conservation of Soil Resources; The Marginal Land Problem; Forestry; The Public Domain; Federal Reclamation; Land Settlement and Colonization; Land-Use Planning. Chapter IV, pages 14-16: "Losses of soil resources due to the removal of plant-supporting elements by cropping have been substantial in some regions, but there are ample supplies of these elements which can be applied to the soil in the form of commercial fertilizers, to compensate

for such losses. Losses by erosion, which removes entirely the top-soil, are much more serious. Every practicable method of control is being used, according to the character of the land. Reforestation and reseeding to grass of the steeper slopes, soil-conserving cropping systems, strip and contour farming, terracing and other erosion-control engineering works, and control of grazing constitute the more common of these methods."

CHAPMAN, H. H. (2597)

STATE CONSERVATION AGENCIES. IS FURTHER CONSOLIDATION DESIRABLE? Conn.

Woodlands 1: 9-11. February 1936.

Two theories for the administration of a State's natural resources are discussed: (1) The plan of consolidation; and (2) the plan of specialization. The form of organization adopted by Connecticut is described with data proving its success.

CHASE, STUART. (2598)

PLANNING FOR NATURAL RESOURCES IN AMERICA. Conservation 2: 1. October 1936.

Condensed from paper read before the third World Power Conference, Washington, D. C., September 1936. "Shall we move the people from the blighted areas, let them remain there on a dole, or reconstruct the natural resource base?"

CLAYTON, C. F., AND NICHOLLS, W. D. (2599)

LAND UTILIZATION IN LAUREL COUNTY, KENTUCKY. U. S. Dept. Agr. Tech. Bull. 289, 100 pp., illus. 1932.

This bulletin reports the findings of a study, the principal objectives of which were: (1) To determine the present major uses of the land, that is, whether for crops, pasture, or woodland; (2) to relate the present utilization of the land to basic physical conditions for the areas studied; (3) to trace the relationship between the physical characteristics of land and (a) the distribution of land among various uses, (b) the size of the farm business, (c) the amount and sources of farm and other income, (d) the sources and value of the family living, and (e) the composition and characteristics of the people; and (4) to outline a land-utilization program.

COFFEY, GEORGE N. (2600)

CLAY DUNES. Jour. Geol. 17: 754-755. November-December 1909.

The writer describes a reconnaissance soil survey of south Texas in the prosecution of which some long, narrow clay ridges were encountered. Their formation and provenance are discussed.

COHEE, M. H. (2601)

EROSION AND LAND UTILIZATION IN WISCONSIN. Wisc. Col. Agr. Ext. Stencil Cir. 153, 11 pp., illus. 1934.

Results of a study made in a selected area in 1933 are given. "The purpose of this project was to determine the utilization of the land on the different slopes, and how this utilization affected erosion. The significance of this study lies in the fact that much of the prevention and control of erosion lies in proper land utilization . . ." Pasture and forest land uses and public policies for erosion control are included.

CONDRA, G. E. (2602)

LAND-USE PROBLEMS IN NEBRASKA. Univ. Nebr. Conserv. and Survey Div. Bull. 7, 20 pp. 1934.

Fundamental principles in land use for future development of the State are discussed. Land resources are described. "The three principle forms of land reclamation in Nebraska are irrigation, drainage, and forestation." Tables show the amount of land publicly owned or used for public purposes.

CONNER, A. B. (2603)

SOIL EROSION STUDIES. Tex. Agr. Expt. Sta. Ann. Rept. 44: 7-8. 1931.

The function of the Texas Agricultural Experiment Station includes the mapping and classification of the soils of the State. The branches of soil study are discussed.

- COOKE, M. L. (2604)
ON WATER PLANNING FOR THE NATION. Jour. Amer. Water Works Assoc.
27: 949-963, illus. August 1935.

Responsibility for use and control of water is considered and the statement made: "Unless we can cope quickly and competently with soil erosion and its related water problems, our most prized national possessions will gradually lose their significance—our political institutions, our struggle for justice and equality of opportunity, even liberty itself." The relation of soil-erosion control and water-works engineering through public cooperation, hindrances of politics, constitutional, legal and other retarding influences are dealt with. "To accomplish this high purpose of saving our soils, and thereby our civilization, we need competent and bold planning, adequate spending, and a spirit of high devotion." Accompanied by literature citations.

- CRADDOCK, G. W., JR. (2605)
RANGE WATERSHED CONSERVATION; AN ESSENTIAL TO LAND-USE PLANNING IN THE ARID WEST. Amer. Bankers Assoc. Agr. Comm. Bull. 10: 1. 1936.

The author discusses vegetation and revegetation of depleted watershed lands in relation to the conservation of perennial streams and water flow, and shows how accelerated erosion has robbed the soil of essential plant nutrients in unregulated areas where streams become swollen with melting snow.

- CULLINGS, E. S. (2606)
OUTLINE OF PROJECT FOR A COMPREHENSIVE STUDY OF THE MOHAWK WATERSHED. N. Y. State Planning Div. Bull. 22, 21 pp., illus. March 1936. [Mimeographed.]

In this study it is recommended that the following factors be considered: Precipitation and run-off, frequency and magnitude of great storms; floods and flood control; water supply; water power; stream pollution; wildlife; recreational use of waters; land use; reforestation; soil conservation and erosion control; and transportation.

- CUNNINGHAM, R. N. (2607)
LAND TO SPARE—A CONSERVATION PROBLEM ON THE LAKE STATES. U. S. Dept. Agr. Yearbook 1935: 238-241, illus. 1935.

"What to do with 60 million acres of roughly wooded, cut-over, and other wild land is the problem which is being forced upon the Lake States, Michigan, Wisconsin, and Minnesota, by ever-increasing tax delinquency." The problem is discussed from the standpoint of forest management.

- CUTLER, J. S., and PASCHALL, A. H. (2608)
PHYSICAL LAND INVENTORY FOR REPLANNING LAND USE. Amer. Soil Survey Assoc. Bull. 17: 53-56. 1936.

In proposing land-inventory policies the authors discuss topography, soil type, erosion, and cover. The procedure of the Ohio reconnaissance erosion survey is outlined giving details on three small areas: Muskingum River watershed, Salt Creek project survey, and Guernsey County survey.

- , PASCHALL, A. H., and CONREY, G. W. (2609)
GENERALIZED LAND-USE SUGGESTIONS FOR OHIO. Ohio Agr. Expt. Sta. Bimonthly Bull. 22: 118-123, illus. 1937.

Some tentative general suggestions for land use are made. "The recommendations are based on studies made on the several soil-conservation projects, experiences in CCC camp work areas, and on the cooperative surveys made jointly by the Agricultural Adjustment Administration, the Ohio Agricultural Experiment Station, and the Soil Conservation Service."

- , PASCHALL, A. H., and CONREY, G. W. (2610)
SOME PROBLEMS IN ADJUSTING LAND USE. Ohio Agr. Expt. Sta. Bimonthly Bull. 22: 97-104. 1937.

"Soil conservation may be defined as 'maintaining the productive capacity of the land.' It is the opposite of soil deterioration and can be achieved through attention to the various factors that lead to depletion of the soil." The authors present a general land-use classification of agricultural lands and discuss the factors affecting land use—the soil, slope, extent of erosion, plant cover, present field location. The economic factors must

be determined for each tract of land: Markets, necessity for economic returns, land tenure. Steps are suggested for readjusting land use on the farm.

DARLING, J. N.

(2611)

A NATIONAL CONSERVATION PROGRAM. *Horticulture* 12: 352. October 15, 1934.

An address before the National Council of State Garden Club Federations. Advises them to have local, State, and national plans for conservation work ready when money and men are available. States should be surveyed in readiness for future programs of conservation.

FERRY, J. F.

(2612)

LAND PROBLEMS AND INDUSTRIAL EXPLOITATION IN MONONGALIA COUNTY, WEST VIRGINIA. U. S. Resettlement Admin. Land Policy Cir., pp. 15-18. July 1937. [Mimeographed.]

The inevitable result of paying scant attention to soil-conserving practices has been a general depletion of soil fertility and county-wide erosion. Human, economic, and industrial factors have also had a share in the depletion of land resources in this area.

FLEMING, B. P., AND MATHEWS, F. D.

(2613)

REPORT ON A RECONNAISSANCE OF THE SAN SIMON RIVER IN GRAHAM AND COCHISE COUNTIES, ARIZONA, FOR THE PURPOSE OF INVESTIGATION AND REPORTING UPON MEASURES FOR EROSION AND SILT CONTROL. U. S. Soil Erosion Serv. 8 pp. 1934. [Mimeographed.]

This report discusses a survey, the object of which was to "view erosion conditions and to suggest remedies which, with a limited expenditure of money, might be applied to the solution of some of the more serious problems, of the San Simon and its watershed." A short description of the San Simon is given, and general erosion conditions are indicated. Two previous reports are commented on, and the present problem is described.

FORSLING, C. L.

(2614)

EROSION OF UNCULTIVATED LANDS IN THE INTERMOUNTAIN REGION. *Sci. Monthly* 34: 311-321, illus. April 1932.

The author presents, among other things, a series of general studies in erosion, and also detailed studies of erosion areas. The place of vegetation in preventing soil erosion is discussed in connection with data from research studies as to plant cover and soil stability.

FRANK, BERNARD.

(2615)

FORESTERS AND LAND PLANNING. *Jour. Forestry* 34: 232-263. March 1936.

"Perhaps the greatest service foresters can render as land planners and managers is in this field of community development; namely, through adapting administrative policy and land-use programs to the needs of the population . . ." Tables showing proposed forms of land use for the Norris Lake Forest are presented.

FULLER, G. L.

(2616)

CHARTING THE EFFECTS OF EROSION IN THE OLD PLANTATION BELT OF THE SOUTHERN PIEDMONT. *Amer. Geophys. Union Trans.* 15: 495-500. 1934.

"Five areas of some 8,000 to 10,000 acres each were surveyed in representative locations through the belt. These differed widely as to dominant soil-types. In order to acquire additional information on the distribution of various land conditions within the region resulting from erosion, a strip was surveyed entirely across the State." The writer was appointed to organize and carry out the field work of this survey, and he discusses the results of erosion surveys and related studies with particular reference to soil types.

(2617)

A SYSTEM FOR CORRELATION OF LAND FORMS AND COVERS WITH SOIL CLASSIFICATION. *Soil Sci. Soc. Amer. Proc.* 1: 463-468. 1936.

Considers soil type, present land use or ground cover, slope, and character and degree of erosion of dominant importance in soil conservation surveys.

- GARRETT, G. (2618)
 MANAGED AGRICULTURE. Sat. Evening Post 208: 12-13, 72-77, illus. November 2, 1935.
 "What the New Deal undertook to do for agriculture was to restore its golden age." The Agricultural Adjustment Act is discussed. Other projects outlined are the land-buying program, the resettlement program, the rehabilitation project, and the soil conservation project.
- GATES, P. W. (2619)
 AMERICAN LAND POLICY AND THE TAYLOR GRAZING ACT. U. S. Resettlement Admin. Land Policy Cir. pp. 15-37, illus. October 1935.
 "This Act, which embodies the progressive principles of conservation and planned use of land and its resources is not the first, but rather the last, of a series of similar measures which have completely reversed our traditional land and agricultural policy . . ." The author examines the problems created by wasteful exploitation of natural resources and analyzes the provisions of the Taylor Act as they affect land policies. "The removal of the forest cover, together with the drainage of swampy areas, has hastened the run-off and increased erosion. Erosion in previously forested areas has washed away much of the soil, which in turn has silted up the rivers, increased the flood menace . . ."
- GEIB, H. V., AND GODDARD, I. T. (2620)
 RECONNAISSANCE EROSION SURVEY OF THE BRAZOS RIVER WATERSHED, TEXAS. U. S. Dept. Agr. Misc. Pub. 186, 47 pp., illus. 1934.
 "This publication presents the results of a reconnaissance erosion survey of an area of a little more than 27,000,000 acres, comprising 70 counties and parts of counties lying within the Brazos River watershed in Texas. The survey was made in cooperation with the Texas and Oklahoma Experiment Stations."—Expt. Sta. Rec. 71: 397. 1934.
- GORRIE, R. M. (2621)
 EROSION SURVEY OF THE UHL VALLEY. Indian Forester 63: 218-222, illus. April 1937.
 "In the summer of 1936 a detailed survey of erosion conditions in the catchment area of the Uhl river was undertaken at the request of the Chief Engineer . . . It is not proposed to describe the engineering project in detail, but this survey constitutes the first attempt in India to make a detailed survey of erosion conditions and a short outline of the methods adopted may, therefore, be of some interest to readers."
- THE USE AND MISUSE OF LAND. Oxford Forestry Mem. 19, 80 pp., illus. 1935. (2622)
 "The following report has been . . . rendered possible through the generosity of the Leverhulme Research Fund." It deals with the various ramifications of the misuse and abuse of forest land and the need for a well-planned land policy as a control measure. Main headings are: Forestry as a Factor in Land Management; Grazing and Range Management; Overgrazing as a Primary Cause of Soil Erosion; Value of Vegetational Covering in Stream-flow Control; Forestry as a Factor in Farm and Village Economy; Farm Erosion and Its Control; Other Examples of the Misuse of Land; and Public and Private Control of Land.
- GRAVES, H. S. (2623)
 NATIONAL PLANNING IN THE CONSERVATION OF NATURAL RESOURCES. Amer. Forests 41: 59-60. February 1935.
 The author discusses the importance of the report of the National Resources Board and its ground work for coordinating and rounding out public conservation policies. "The Report of the National Resources Board is a summary of detailed reports of a number of federal bureaus, committees, and boards. It gives a broad view of the natural resources problems . . . It is specially valuable in clarifying the purposes of the various new undertakings in land-use and water-use."
- GRAY, L. C. (2624)
 BASIC ELEMENTS OF A NATIONAL PROGRAM OF LAND REFORM. 12 pp. Washington, D. C. 1937. [Mimeographed.]
 Defines the objectives of the Resettlement Administration in land use. The resettlement program is concerned with the economic influences which

have encouraged soil erosion and with the effects of soil erosion upon the standards of living in any area. An important objective of the program is "... to bring about the necessary changes in land tenure or methods of land use which will make it economically possible to put into effect the technical means of stopping erosion which other agencies have devised." Paper read before conference of Southern Agriculture Workers, Nashville, Tenn., February 3, 1937.

GRAY, L. C.

(2625)

CROP REDUCTION AND THE LAND-USE PROGRAM. U. S. Bur. Agr. Econ. Agr. Situation 20: 11-13. July 1, 1936.

Submarginal farm-land problems as involved in land-use planning are considered. The author states that "one of the obvious purposes of the land-utilization program is to bring to an end the destruction of natural resources which the continued occupation of unproductive farms entails. In the southern Appalachians, for example, the cultivation of steep slopes has resulted in the serious erosion and depletion of large areas of land. The restoration of a valuable forest crop on these hillsides is prevented by the operation of farms." Similar conditions prevailing in the more arid portions of the western plains, due to wind erosion, are discussed.

(2626)

LAND PLANNING. Pub. Policy Pamphlet 19: 37 pp. Univ. Chicago Press. 1936.

This pamphlet describes, among other major factors influencing land requirements, the significance of forest conservation and its relation to soil conservation. The soil-erosion problem is discussed briefly.

(2627)

A NATIONAL POLICY FOR LAND AND WATER . . . A PAPER READ BEFORE THE NATIONAL RECLAMATION CONFERENCE, SALT LAKE CITY, UTAH, NOVEMBER 15, 1935. U. S. Resettlement Admin., Div. Land Utilization. 19 pp. [Washington, D. C.] 1935. [Mimeographed.]

Six steps necessary for a sound national system of reclamation are suggested: "(1) Complete divorcement from politics through control by a nonpartisan board; (2) inclusion of both drainage and irrigation; (3) development on the basis of plans for water use and conservation covering entire watersheds; (4) close integration with agricultural and settlement policies of the Nation; (5) substitution of a low interest rate for the subsidy involved in exemption from interest charges on capital advanced for construction; (6) due allowance for costs properly allocated to power, flood control, and other elements in multiple-purpose projects, and also for measurable indirect benefits to other private interests as primary conditions for the development of projects."

(2628)

THE RESETTLEMENT LAND PROGRAM. Amer. Forestry 42: 347-349, 389, illus. August 1936.

The writer discusses submarginal farm problems in various States with regard to the land-use program of the Resettlement Administration. "Types of improvement undertaken cover a wide field. Erosion control, forest improvement, building of roads and trails, construction of recreation facilities such as cabins, picnic areas, and lakes and the improvement of wildlife environment are among the most important features of the development program which has been worked out in cooperation with agencies that will later manage these lands."

(2629)

THE SOCIAL AND ECONOMIC IMPLICATIONS OF THE NATIONAL LAND PROGRAM. Jour. Farm Econ. 18: 257-280. May 1936.

Federal land policies past and present are discussed with special consideration of problems confronting the various land utilization and land reclamation agencies of the New Deal. Of the Soil Conservation Service, the author says "it has concerned itself with large-scale demonstrations of erosion control practices, primarily on private land under contracts with farmers, and has conducted a reconnaissance survey of erosion conditions throughout the United States."

In a discussion by Noble Clark, of the University of Wisconsin, a new national land-program organization is suggested.

- GRAY, L. C. (2630)
THE USE OF LAND. Amer. Country Life Conf. Proc. 16: 98-99. August 1-4, 1933.

"It has been estimated by Mr. H. H. Bennett that through erosion 35,000,000 acres of cultivated land have been essentially destroyed for crop production . . ." The development of a program of erosion control is regarded as a hopeful step in correcting soil conditions.

- AND BAKER, O. E. (2631)
LAND UTILIZATION AND THE FARM PROBLEM. U. S. Dept. Agr. Misc. Pub. 97, 54 pp., illus. 1930.

The authors present some of the highlights of existing conditions and tendencies in the use of land without attempting to formulate a concrete and specific policy of land utilization. Forestation and soil conservation are treated on pages 38-45.

- GREEN, W. J., AND SECREST, E. (2632)
FOREST CONDITIONS IN OHIO. Ohio Agr. Expt. Sta. Bull. 204, pp. 237-277. 1909.

A reconnaissance survey of the natural forests and artificial forest plantations in Ohio is presented.

- GREENE, H. (2633)
SOIL PROBLEMS OF THE ANGLO-EGYPTIAN SUDAN. Empire Jour. Expt. Agr. 5: 1-10, illus. January 1937.

"Practically no information is available in the Sudan on the occurrence of soil erosion along the fringe of the rain-belt . . . To ascertain the extent of soil erosion now occurring in the Sudan and to devise means of control is an urgent, practical responsibility to be faced by the Government . . . There is evidently scope for aerial reconnaissance which, if checked by ground surveys, should greatly expedite the work."

- GUFFEY, JOSEPH, F. (2634)
LAND AND WATER RESOURCES OF AMERICA. Cong. Rec. v. 80: 3419-3421. March 9, 1936.

Conservation of land and water is a desperate necessity. "The national pattern of control for land and water must be formulated by Congress, because Congress is the only political body we have which represents the whole Nation."

- HALL, W. C. (2635)
STATE PLANNING AND CONSERVATION. Va. Munic. Rev. 13: 85-87. May 1936.

Text of an address delivered before the National Planning Conference held in Richmond, Va., May 4, 1936. States that "the work of the State Planning Board should be intimately related to the work of the State Commission on Conservation and Development, through all of its divisional activities."

- HAMMAR, C. H., AND JENNY, HANS. (2636)
LAND CLASSIFICATION AS A BASIS FOR LAND USE PLANNING. Jour. Farm Econ. 16: 431-443, illus. July 1934.

"Economic planning has become an accepted fact, and the National Planning Board, together with Regional and State Planning Boards, are now considering the techniques for carrying the effects of planning in its broader sense into a much more intimate contact with the life of the average American." The purpose of this paper is to make understandable, land-classification material not sufficiently easy of interpretation to planning boards for ready use. A tentative list of differentia is suggested for Missouri, specifically those land features and attributes necessary to the planner.

- HARTMAN, W. A., and WOOTEN, H. H. (2637)
GEORGIA LAND USE PROBLEMS. Ga. Agr. Expt. Sta. Bull. 191, 195 pp., illus. 1935.

"The purpose of this study is to mobilize and to present pertinent facts as an aid in the formulation of plans [for a construction program of land use] by public officials and interested citizens . . . Adoption of such a program by the Federal government, the state, and the counties, will result in material benefits to established farmers, to business men, to land owners, and to the general public."

HAUSEN, WALTER.

(2638)

DISSECTED DRIFT PLAIN OF SOUTHEASTERN NEBRASKA. *Econ. Geogr.* 12: 381-391, illus. October 1936.

Discusses land utilization on four different types of soil, namely, uplands with good soils, bottom lands with comparatively rich alluvial soils, poorly drained bottom lands with salt marshes, and uplands with stony soils. Directions for utilization of these types are of a generalized nature with the fact stressed that a long-range policy is the only solution. Sweetclover is recommended for pasture on stony soils subject to erosion.

HAW, J. W.

(2639)

IRRIGATION AND THE LAND-USE PROGRAM. *Civ. Engin.* 6: 663-667. October 1936.

The author emphasizes the importance of reclaiming arid land by irrigation as a part of current policies and programs for the use of natural resources and tells how increase of population, particularly in the West, will require more acreage for food and fiber crops, which can only come from reclaiming arid land. The seasonal grazing of livestock is also discussed.

HENDRICKS, H. E.

(2640)

A LAND USE AND SOIL MANAGEMENT PROGRAM FOR TENNESSEE. *Tenn. Univ. Pub.* 197, 24 pp., illus. November 1936.

"It is the purpose of this publication to outline in as brief form as possible the relation of soil management to land utilization, with proper regard for soil conservation through the control of erosion and the maintenance of soil fertility."

HENRY, H. H.

(2641)

LAND RESOURCES. Pacific Northwest Regional Planning Comm. Consultant's Rept. 1934-35: 48-64, illus. 1935. [Mimeographed.]

Discusses soils, soil provinces, the program of the Soil Erosion Service, watersheds, drainage basins, and present land use in Montana, Oregon, and Washington.

HIBBARD, B. H.

(2642)

A HISTORY OF THE PUBLIC LAND POLICIES. 579 pp. New York, Macmillan Co. 1924.

A review of our public-land policies of the past and the disastrous effects of these policies on American agriculture. On pages 472-475 the author writes of the period of conservation. "About the year 1900 a great number of men prominent in politics, educators, editors, and others of public spirited character became suddenly awakened to the patent fact that the natural resources of the country could not be lavishly used, and wantonly wasted indefinitely without great danger of ultimate disaster . . . Thus far no far-reaching plan has been devised to prevent soil depletion and worse, nothing has yet been found feasible for the control, through social action, of soil erosion. We are still 'mining' the soil."

HOLLOPETER, CHARLES A.

(2643)

MAPPING AT STILLWATER CREEK. *The Land, Today and Tomorrow* 1: 22-23. November 1934.

"Mapping, as a source of basic information on the Stillwater Creek project in Oklahoma, is one of the most important phases of the soil erosion project . . ." The article describes the methods, the value of aerial pictures as an aid to mapping, and the general utility of maps in erosion control.

HOWE, F. B., GUSTAFSON, A. F., and JOHNSTONE-WALLACE, D. B.

(2644)

SOIL, FIELD-CROP, AND PASTURE MANAGEMENT FOR SUFFOLK AND NASSAU COUNTIES, NEW YORK; SOIL MAP AND SOIL TYPE DESCRIPTIONS. N. Y. (Cornell) Agr. Expt. Sta. Bull. 600, 67 pp., illus. 1934.

HURLBURT, V.

(2645)

LAND USE PLANNING. *Penn State Farmer* (n. s.) 2: 370, 393-394. June 1937.

In describing the objective of a land-use planning program the writer defines the term as follows: "Land use planning deals with cases, not with theories; it is not a compilation of abstractions or hypotheses, but thought-

fully deals with problems of human lives and welfare." The program for Pennsylvania includes an analysis of the problems of Cameron County and a land-use study of Bradford County.

HUTCHINSON, C. B.

(2646)

NEED FOR A LAND POLICY IN THE UNITED STATES. Calif. Dept. Agr. Monthly Bull. 22: 88-94. 1933.

"The main agricultural problem of this country is that of adjusting agricultural production to the population requirements . . ." After reviewing the land utilization studies that have been made, the writer says that the time is ripe for serious attack on the problem in a large way, but that the plans of each State "should be developed in a manner fully coordinated with the plans of other States and in line with and a part of the national procedure that is being evolved by the National Land-Use Planning Committee."

HYDE, ARTHUR M.

(2647)

LAND-USE PLANNING AND CONSERVATION. U. S. Dept. Agr. Yearbook 1933: 52-65. 1933.

In his report for 1932 the Secretary of Agriculture includes a discussion of land utilization, soil erosion, national forests, and wildlife refuges.

IOWA STATE PLANNING BOARD.

(2648)

SECOND REPORT TO THE NATIONAL RESOURCES BOARD, APRIL 1935. 226 pp., illus. [Des Moines.] 1935.

Part I of this report sets forth a land-use program for Iowa which includes the following: Soil survey and its relation to land-use planning; forestry and soil conservation; improvement of tenant-landlord relationships; debt burden and soil conservation; work of the soils specialist; coordination of soil-erosion activities; wildlife areas and land-use planning.

JAMES, HARLEAN, ED.

(2649)

AMERICAN PLANNING AND CIVIC ANNUAL. 356 pp., illus. Washington, D. C. Amer. Plan. and Civic Assoc. 1935.

Partial contents: Why We Need a National Planning Board, by H. L. Ickes, pages 3-5; National Planning in Practice, by C. E. Merriam, pages 6-10; Land-Use Planning, by H. R. Pomeroy, pages 10-13; Wildlife Areas and National Land Planning, by J. N. Darling, pages 37-40; The Place of Forestry in National Planning, by F. A. Silcox, pages 42-45; Land Planning and Farm Adjustment, by H. A. Wallace, pages 48-51; Agriculture's Democratic Program Planning, by H. R. Tolley, pages 51-54; Some Problems of Land Policy, by L. C. Gray, pages 55-58; The Land Development Program, by M. M. Kelso, pages 59-61; Soil Erosion, by H. H. Bennett, pages 74-76; Elements in Rural Land Planning, pages 76-78; The Planning Achievements of the Pacific Northwest, by M. N. Dana, pages 130-134; The New England Regional Planning Commission, by F. P. Clark, pages 135-136; Work of State Planning Boards, by R. H. Randall, pages 140-150; County Planning Keeps Pace with State Planning, by M. H. Dunlap, pages 201-204; Rural Zoning, by C. I. Hendrickson, pages 204-207. Organization and Activities of County Planning Commissions, by C. A. McClure, pages 208-210; The Urban and Rural Land-Use Survey, by A. R. Mann, pages 241-248.

(2650)

LAND PLANNING IN THE UNITED STATES FOR THE CITY, STATE, AND NATION. 427 pp., illus. New York, Macmillan Co. 1926.

This book is divided into three sections: Section 1 deals with beginnings in American planning; section 2, modern city planning, its aims and accomplishments; and section 3, national and State planning.

JAMES, P. E.

(2651)

THIRTY-SECOND ANNUAL MEETING OF THE ASSOCIATION OF AMERICAN GEOGRAPHERS. Geogr. Rev. 26: 305-309. 1936.

Contains information concerning a meeting held at St. Louis on December 30 and 31, 1935 and January 1, 1936. A symposium on land utilization included papers on Ireland, Scotland, State planning in Wisconsin, and work of the Tennessee Valley Authority. Other papers dealing with land planning, areal studies, population and occupancy patterns, urban and economic studies, geomorphology, meteorology, and climatology were read.

JARDINE, J. T., and BEAL, W. H.

(2652)

REPORT ON AGRICULTURAL EXPERIMENT STATIONS, 1935. 160 pp. 1936.

Pages 14-16 are devoted to land use and soil conservation. Secretary Wallace is quoted as saying: "When the soil suffers beyond a certain point, the people of the United States are running up a bill which few civilizations have ever been able to pay." Among the points discussed are: utilization of cut-over lands; land use in Pennsylvania; use and resettlement of marginal lands; soil conservation in dry regions; strip cropping to prevent soil erosion; progress of land terracing in Texas.

JARVIS, T. D.

(2653)

SOIL STUDIES IN RELATION TO LAND UTILIZATION RESEARCH. *Sci. Agr.* 15: 287-296, illus. January 1935.

The writer discusses the problem of the crop production phase of land utilization from the following angles: (1) The present status of agricultural development in Canada; (2) the inherent weaknesses in our present land utilization; (3) accumulated experience vs. scientific research as a means of increasing efficiency in land utilization; (4) the scope of soil surveys in our regional research program.

JOERG, W. L. G.

(2654)

GEOGRAPHY AND NATIONAL LAND PLANNING. *Geogr. Rev.* 25: 177-208, illus. April 1935.

The author quotes from a report of the Science Advisory Board. He discusses the need for research concerning land use, climatic risks, surface and slope method of soil research, soil productivity, retirement of submarginal land, forest land, range land, wildlife resources, water and mineral resources and concludes by stressing the need for the topographic mapping of the United States.

JOHNSON, DOUGLAS

(2655)

RECONNAISSANCE SURVEY OF FORMER SHORE LINES ALONG THE ATLANTIC AND GULF COASTS. *Carnegie Inst. Wash. Year Book* 31: 345-346. 1932.

"In the spring and summer of 1931, the writer made a reconnaissance survey of coastal terraces and other possible evidences of former marine levels from Rhode Island down the Atlantic Coast to Florida, thence along the Gulf Coast as far as Corpus Christi, Texas." The method of the survey is described.

JOHNSON, S. E.

(2656)

LAND USE READJUSTMENTS IN THE NORTHERN GREAT PLAINS. *Jour. Land and Pub. Econ.* 13: 153-162. May 1937.

"The many maladjustments in land use in the Northern Great Plains are partly the result of continuing an outmoded homestead policy which encouraged settlement of land unsuited to crop farming." Discusses transition zones, i. e., an area containing land that should stay in crop production but changing to land that is definitely unsuited for such purposes. A positive program, based on adequate research for these areas is proposed. Some aspects of overgrazing are considered.

— AND STEELE, H. A.

(2657)

SOME ASPECTS OF THE FARM MORTGAGE SITUATION IN SOUTH DAKOTA AND THEIR RELATION TO A FUTURE LAND USE POLICY. *S. Dak. Agr. Expt. Sta. Cir.* 9, 63 pp., illus. 1933.

JONES, EWING.

(2658)

THE CCC'S PART IN SOIL EROSION CONTROL. *Earth Mover* 22: 12-14, illus. December 1935.

At over 500 camps the C. C. C. are demonstrating that soil erosion can be controlled by proper land use.

KANSAS STATE PLANNING BOARD.

(2659)

TWENTY-FIVE YEAR PLAN FOR SHAWNEE COUNTY. 42 pp., illus. June 1935. [Mimeographed.]

Among other problems considered in this plan are drainage and flood control, storage capacity, and the Kansas River maintenance.

- KELLOGG, C. E. (2660)
A SYSTEM OF LAND CLASSIFICATION. 3rd Internatl. Cong. Soil Sci., Oxford, England, Trans. 1: 283-286. 1935.
The writer discusses a natural land classification based upon the inherent qualities of the land. "Such a classification would, to a great degree, consist of the definition and arrangement of natural land types in terms of climate, relief, stoniness, native vegetation and their mutual relationships . . . Practical land classification is concerned with the use of the land by man, both qualitatively and quantitatively, the type of use and the relative potentiality within the type."
- KELLOGG, C. E., AND BARNES, C. P. (2661)
DEFINITION OF TERMS USED IN LAND UTILIZATION. Amer. Soil Survey Assoc. Bull. 17: 93-94. 1936.
An effort to define more precisely expressions used in the comparatively recent development of land-utilization studies.
- KELSO, M. M. (2662)
PROBLEMS OF THE UPPER RIO GRANDE. U. S. Resettlement Admin. Land Policy Cir. 3: 19-22. June 1937.
Some preliminary reports on findings of the Interdepartmental Committee of the Rio Grande Valley. This committee was appointed to assemble material on land-use conditions in this valley.
- KNEIPP, L. F. (2663)
LAND UTILIZATION AND PLANNING. Jour. Forestry 34: 257-262. March 1936.
"In essence, land planning is nothing more than the analysis and measurement of national needs, both present and prospective, quantitatively and geographically, for every type of service and commodity derived from lands; followed by systematic survey, classification, and dedication of the land resources of the Nation to the types of services or commodity production thus determined, in the proper proportions and geographic relationships." Programs of the National Resources Committee, the Agricultural Extension Service, and the Resettlement Administration are considered at length.
- KNIGHT, H. G. (2664)
SOIL. South. Agr. 66: 7, 29, illus. March 1936.
The author urges farmers to study available soil surveys, in order better to tackle the problem of erosion.
- (2665)
SOIL CONSERVATION A MAJOR PROBLEM OF AGRICULTURAL READJUSTMENT. Natl. Conf. Land Utilization Proc. 1931: 153-162. 1931.
"Owing in large measure to destructive soil erosion, not only throughout the older settled Eastern States but throughout the entire Nation, the subject can no longer be ignored. Serious and irreparable damage has already been done. The effects of destructive erosion are cumulative, and if no effort is made to retard its ravages land abandonment may increase at a more rapid rate in the future than in the past." Investigations by State experiment stations are described and the results given. Erosion data for the whole country are reviewed.
- LADD, C. E. (2666)
STATE LAND USE COMMISSIONS AND PROGRAMS OF LAND USE. Jour. Farm Econ. 15: 243-244. April 1933.
This article discusses the inadvisability of State land-use commissions and attempts to show why land-use programs should be carried out by existing agencies, and research and classification work by the land-grant colleges. The author also discusses two essentials in a land-use program (1) classification of land, and (2) formulation and execution of a program for putting each class of land to its proper use.
- LAMBERT, A. W. (2667)
CORRELATING GROUND AND AIR SURVEYS; HOW MAPS ARE MADE FROM AERIAL PHOTOGRAPHS BY USE OF STEREOSCOPE AND GROUND CONTROLS. Civ. Engin. 6: 732-736. November 1936.
Describes in some detail the art of photogrammetry.

LAMONT, T. E.

(2668)

LAND UTILIZATION AND CLASSIFICATION IN NEW YORK AND ITS RELATION TO ROADS, ELECTRICITY, AND REFORESTATION. N. Y. Agr. Col. (Cornell) Ext. Bull. 372, 60 pp., illus. 1936.

LANE, C. N.

(2669)

SUBMARGINAL FARM LANDS IN NEW YORK STATE. N. Y. State Planning Bd. Rept. 56 pp., illus. 1935. [Multigraphed.]

This report summarizes the findings of a preliminary land-classification survey made in New York State in the fall of 1934 through the cooperation of the New York State College of Agriculture and the National Resources Board. "The purpose of the survey was to determine the principal areas in the State that were better suited to forestry and to recreational uses than to agriculture."

LEE, L. L.

(2670)

LAND RESOURCES OF NEW JERSEY. N. J. Agr. Expt. Sta. Bull. 552: 47-57. 1933.

The writer, in outlining the land resources of New Jersey describes the topography, the location and present use of land, the potential use of land, the types of land found in the Kittatinny Valley, the territory between Riegelsville and Trenton, the lowlands of the Passaic Valley and other sections of the State. There is an increasing need for definite State policies in crop production and soil conservation.

LIGUTTI, L. G.

(2671)

THE MAN WITH A PLOW. Commonwealth 25: 513-514. March 5, 1937.

Outlines the evils resulting from widespread farm tenancy and shows how an increase in ownership of farm lands will facilitate proper land-use policies.

LIPMAN, J. G.

(2672)

SOCIAL AND ECONOMIC FACTORS IN LAND-USE PLANNING IN THE NORTHEASTERN STATES. Econ. Geogr. 11: 217-226, illus. July 1935.

Shows how land use in the Northeastern States is a regional rather than a local problem and proposes water-conservation policies, a stricter selection of areas for residential sites, and a better quality of produce. Part-time farming and commercial farming are considered separately.

LORY, C. A.

(2673)

COLORADO WATER PUZZLE STILL UNSOLVED. IRRIGATION HAS BEEN STATE'S PARAMOUNT PROBLEM SINCE PIONEER DAYS. West. Farm Life 38: 3, 23, illus. June 15, 1936.

Explains urgent need for water conservation in Colorado and suggests possible projects for slope surveys, storage reservoirs, and transmountain diversion developments.

LOVEJOY, P. S.

(2674)

CONCEPTS AND CONTOURS IN LAND UTILIZATION. Jour. Forestry 31: 381-391. April 1933.

"Forestry borrowed its basic concept—production—from agriculture and as in agriculture, the concept has been shifting rapidly to a new base. The fundamental thing, as now appears, is not increased production of farm and forest crops, but the identification, dedication and soundly economic use of such of our lands as have a geography and a quality to justify such use. The intensive use of farm and forest land, under the orthodox production formulae, will evidently be justified in only a small fraction of the total land available. What then of the marginal and submarginal lands?"

LOWDERMILK, W. C.

(2675)

CONSERVANCY DISTRICTS IN LAND MANAGEMENT. U. S. Soil Conserv. Serv. 4 pp. 1934. [Mimeographed.]

Attributes the cause of increasing siltation rates in the West to accelerated erosion brought on by vast removal of vegetative covering. The formation of conservancy districts as a means of enacting and enforcing land-use regulations is recommended.

LOWDERMILK, W. C.

(2676)

LAND USE PLANNING OF EROSION CONTROL DEMONSTRATION PROJECTS OF THE SOIL EROSION SERVICE. 3 pp. 1934. [Mimeographed.]

"Completion of our surveys may show that a larger part on the [Piedmont] area should be withdrawn from cultivation. The occupants of the rededicated cultivated lands must be or should be provided for in a scheme of land use planning." Treatment of these areas is suggested and described briefly.

(2677)

SOME NECESSARY DISTINCTIONS IN LAND USE PROBLEMS. *The Land, Today and Tomorrow* 1:5-6. October 1934.

In commenting on the inception of *The Land, Today and Tomorrow*, official gazette of the Soil Erosion Service, and the scope of its usefulness, the writer states: "It is necessary at this point to make such distinction between depletion of soil productivity resulting from the consumption of plant nutrients within the soil by plants, and the destruction of the physical body of the soil . . ." Both conditions are considered. Causes of unprofitable land cropping are also discussed.

LUCAS, BRODER F., AND CALLAHAN, E. P.

(2678)

MAJOR RURAL LAND USE PROBLEMS IN TENNESSEE. *Tenn. State Planning Comm.* 23 pp., illus. March 1936.

This report on land-use problems and farm management describes, pp. 17-19, Tennessee areas on which serious erosion should be checked by a change in the cropping system. The areas in question are the upland region of west Tennessee; the central basin; the southern, eastern, and northern highland rim; and east Tennessee. Control practices for each area are suggested.

MCCRORY, S. H., YARNELL, D. L., AND McEATHRON, W. J.

(2679)

REPORT UPON THE RECLAMATION OF THE OVERFLOWED LANDS IN THE MARAIS DES CYGNES VALLEY, KANSAS. *U. S. Off. Expt. Stas. Bull.* 234, 53 pp., illus. 1911.

Reports a survey made in Kansas and recommends means to ameliorate overflow conditions of valuable farm land. "It is accompanied by one map showing the watershed of the valley, three sheets showing topographical details of the valley and stream, and the plans suggested for their protection, one profile, and one standard levee cross section, all of which are essential parts of the report."

MCGREW, P. C., AND HORNER, G. M.

(2680)

SOIL AND WATER CONSERVATION INVESTIGATIONS—PROGRESS REPORT 1931-35. *U. S. Soil Conserv. Serv. SCS-ESR-2*, 123 pp., illus. 1937. [Mimeographed.]

This report describes the findings of studies conducted at the soil conservation experiment station at Pullman, Wash., and the substation at Cunningham, Wash. The studies embrace research in run-off, tillage and cropping practices, terracing studies, gully control, erosion on grazed lands, windbreaks, etc.

Literature cited, pp. 116-117.

McNAMARA, KATHERINE.

(2681)

BIBLIOGRAPHY OF PLANNING 1928-1935; A SUPPLEMENT TO MANUAL OF PLANNING INFORMATION, 1928, BY THEODORA KIMBALL HUBBARD AND KATHERINE McNAMARA. 232 pp. Cambridge, Harvard Univ. Press. 1936.

For references on conservation, land utilization, and water resources, see pages 174-193.

MAHER, COLIN.

(2682)

LAND UTILIZATION AS A NATIONAL PROBLEM WITH SPECIAL REFERENCE TO KENYA COLONY. *East African Agr. Jour.* 2:130-144. September 1936.

The author discusses soil-erosion conditions in Kenya and proposes a system of land tenure so that erosion-control practices may be facilitated.

MANN, A. R.

(2683)

AGRICULTURAL PLANNING AS AN ASPECT OF STATE AND NATIONAL PLANNING. *Science* 81:32-35. January 11, 1935.

The author draws attention to the relation and significance of soil conservation to rural land-use planning.

MANN, A. R.

(2684)

PLANNING THE USE OF LAND IN NEW YORK. Conservation (Cornell Rural School Leaflet) 29: 28-31. January 1936.

"In replanning the uses of land in a State, the facts must be gathered as to the past trends in land values and uses, the present and the prospective values and uses, and the factors which determine values and intensity of use to which the land is adapted. Among these latter factors are the physical nature of the soil, including topography, the climatic conditions, and the whole economic and social environment." Land-use planning must be a continuous process, and as conditions change the plan should be changed to conform.

MARBUT, C. F.

(2685)

LAND CLASSIFICATION. 3rd Internatl. Cong. Soil Sci., Oxford, England, Trans. 1: 290-292. 1935.

On the need for land classification in the United States. Knowledge of the character of lands must be known before they are taken out of production. "Such knowledge should result in a classification of these lands on the basis of adaptability to crops and of capacity to produce good yields." The author concludes: "Such a land classification constitutes the fundamental land productivity basis on which agricultural adjustment must be established."

MAST, CAP.

(2686)

WE CAN'T HAVE ANY SECRETS NOW! ILLINOIS FARMS ARE BEING MAPPED BY AIR. *Prairie Farmer* 109: 1, illus. January 2, 1937.

Aerial check-ups on soil-depleted acres for the county soil-conservation committee are cited. The development of aerial mapping is reviewed.

MEAD, E.

(2687)

THE ARID PUBLIC LANDS: THEIR RECLAMATION, MANAGEMENT AND DISPOSAL. *Arid Amer.* 9 (2): 1-9, illus. 1897.

"A somewhat full discussion of this subject."—*Expt. Sta. Rec.* 8: 966. 1896-97.

MEKEEL, H. S.

(2688)

SOCIAL SCIENCE AND RESERVATION PROGRAMS. *Indians at Work* 4: 24-27. November 15, 1936.

Talk given at series of extension conferences in the Indian Service, September 28 to October 17, 1936, stressing importance of recognizing the Indian characteristics. It is pointed out that "the Soil Conservation Service has very wisely put alongside its technical land staffs a socio-economic staff to assay the human potentialities and limitations of the people within a region, realizing that efficient land use depends not only on the land but on the characteristics of the people who will be using the land."

MILLER, F. M. S.

(2689)

BIGGEST AERIAL SURVEY AIDS SOIL EROSION CONTROL. *Pop. Sci. Monthly* 126: 22-24, illus. May 1935.

Description is given of aerial photography under the Soil Erosion Service, for accurate map making of the stricken Indian lands. "The astonishing discovery that most of the United States is inadequately mapped has been made by the Government's National Resources Board. A sum of \$117,531,000 must be spent to obtain much-needed knowledge of topography, to combat soil erosion . . ."

MILLER, G. J.

(2690)

PLANNING AND CONSERVATION. *Jour. Geogr.* 35: 157-160. April 1936.

A discussion of planning and conservation from the standpoint of the geographer including a review of the National Resources Board report for 1934 with abstracts of 28 States and miscellaneous publications on various phases of planning for conservation and utilization of natural resources in the United States. Accompanied by a bibliography on planning.

MISSOURI CONFERENCE ON LAND UTILIZATION.

(2691)

PROCEEDINGS . . . FIRST MISSOURI CONFERENCE ON LAND UTILIZATION. . . Mo. Agr. Expt. Sta. Bull. 323, 62 pp. 1933.

Partial contents: Recent Economic Changes and Their Effect on American Agriculture, by N. A. Olson; Land Inventory and the Problem of Marginal

Lands, by M. F. Miller; Urban and Rural Interest in the Back-to-the-Land Movement, by E. L. Morgan; Forestry Possibilities in Missouri, by F. Dunlap; History of Levees and Drainage in Southeast Missouri, by S. P. Reynolds; Drainage Problems of Grand River Bottoms, by H. K. Johnson; The Human Element in a Conservation Program, by W. Burr.

MISSOURI STATE PLANNING BOARD. (2692)

A STATE PLAN FOR MISSOURI . . . A REPORT TO THE NATIONAL RESOURCES BOARD. 444 pp., illus. April 15, 1935.

This report includes a discussion of land use with respect to erosion, forestry, grazing, tilled crops, drainage, and recreation problems.

MONROE COUNTY [NEW YORK] REGIONAL PLANNING BOARD. (2693)

REPORT OF MONROE COUNTY REGIONAL PLANNING BOARD. 68 pp. illus. 1936. [Mimeographed.]

On pages 8 and 9 of the report the erosion-control program in the Iron-dequoit Creek drainage area is described. "One hundred fifty farmers have agreed to plant one million additional trees during the next several years so that a large portion of the area of poor soils subject to erosion and not now wooded will be protected." Establishment of permanent pastures and construction of check and conservancy dams are part of the program.

MONTANA STATE PLANNING BOARD. (2694)

STAFF REPORT FOR PERIOD ENDING DECEMBER 31, 1936. 87 pp., illus. 1936. [Mimeographed.]

This report presents problems that are considered to demand immediate attention. Among them are problems connected with irrigation, water rights, range depletion, forest protection, soil conservation, and wildlife. A digest of information on the resources of the State is also included.

MOON, J. W. (2695)

TENNESSEE VALLEY SOIL SURVEY PROJECT. Amer. Soil Survey Assoc. Bull. 17: 63-67. 1936.

The objective of this survey is primarily "to classify, map, and describe the soils in such detail and manner as to be of the greatest possible use in problems of soil management and conservation, proper land use, and agricultural development." Details on mapping eroded areas are given.

MORGAN, A. E. (2696)

THE AMERICAN BENT FOR PLANNING. Survey Graphic 25: 236-239, 288. April 1936.

"Planning has been characteristic of all great peoples—the greater their civilization, the more extensive its scope . . . We are exhausting our soils by cropping and erosion at such a rate that we probably consume the equivalent of several thousand years of accumulation of fertility for each century of use." Planning of several kinds in various regions and areas are discussed, among them the T. V. A. "One kind of regional planning in the Tennessee Valley region has to do with control of soil erosion . . . There is no traditional line at which men must stop in their efforts to bring order out of chaos; no limits need be set on our hopes for a more inclusive and masterly synthesis of natural forces."

MORSE, H. HOWE. (2697)

A GRAPHIC METHOD OF SHOWING THE RELATIONSHIPS OF EROSION, SLOPE, AND COVER. Soil Conserv. 2: 67, illus. October 1936.

MUSGRAVE, G. W. (2698)

A QUANTITATIVE STUDY OF CERTAIN FACTORS AFFECTING SOIL AND WATER-LOSSES AS THE LOGICAL BASIS FOR DEVELOPING PRACTICAL METHODS OF EROSION CONTROL. Amer. Geophys. Union Trans. Ann. Meeting 15: 515-521. 1934.

States that the correct design of erosion-control measures is importantly dependent on information centering around three groups of factors (1) those affecting the infiltration capacity of the soil, (2) those affecting the capacity of the surface-storage reservoir, and (3) those affecting the density of the run-off material.

NATIONAL CONFERENCE ON CITY PLANNING.

(2699)

PLANNING PROBLEMS OF CITY, REGION, STATE, AND NATION. 151 pp. Philadelphia, Wm. F. Fell & Co. 1934.

Papers devoted to soil and water conservation and related subjects are: Report On a National Land-Use Program, by L. C. Gray; The Water Resources of the United States, by Morris L. Cooke; and Opportunities in Forest Land-Use Planning, by F. A. Silcox. Presented at the twenty-sixth National Conference on City Planning held jointly with the American Civic Association at St. Louis, October 22 to 24, 1934.

NATIONAL CONFERENCE ON LAND UTILIZATION.

(2700)

PROCEEDINGS OF THE NATIONAL CONFERENCE ON LAND UTILIZATION, CHICAGO, ILL., NOVEMBER 19-21, 1931. 251 pp., illus. Washington, Govt. Print. Off. 1932.

Papers in these proceedings dealing with the relation of land utilization to soil conservation are as follows: Soil Conservation a Major Problem of Agricultural Readjustment, by H. G. Knight (2665); Soil Classification a Basis of Agricultural Adjustments, by J. G. Lipman; Land Utilization in the Western Range Country, by William Peterson; What Methods Should Be Employed To Take Submarginal Lands Out of Agricultural Production?, by H. W. Mumford; and Land Utilization and Conservation, by George D. Pratt.

NATIONAL LAND-USE PLANNING COMMITTEE.

(2701)

THE PROBLEMS OF "SUBMARGINAL" AREAS AND DESIRABLE ADJUSTMENTS WITH PARTICULAR REFERENCE TO PUBLIC ACQUISITION OF LAND. Natl. Land-Use Planning Com. Pub. 6, 24 pp., Washington, Govt. Print. Off. 1933.

"Since its organization in the spring of 1932 the National Land-Use Planning Committee has been giving considerable attention to the problems of those areas that are not clearly adapted to use for farming, generally spoken of as 'marginal' or 'submarginal' . . . The present report . . . may be said to apply to areas where the major use of the land (i. e. farming, forestry, extensive grazing, parks, or other uses) needs to be determined, particularly when the uncertainty as to major use is associated with significant problems of economic and social adjustment." On page 12, the relation of reforestation and vegetative cover to watershed protection and erosion control is shown.

NEW ENGLAND REGIONAL PLANNING COMMISSION.

(2702)

CONNECTICUT RIVER VALLEY WATER RESOURCES BIBLIOGRAPHY. New England Regional Planning Com. Pub. 40, 134 pp. Boston, Mass. August 1936.

The following subjects are included: Geology, precipitation, surface waters, evaporation, ground water, snow surveys, pollution, water supply, water power, flood control, navigation, population, and sewage disposal.

NEW JERSEY LAND USE CONFERENCE.

(2703)

PROCEEDINGS . . . HELD AT NEW BRUNSWICK, NEW JERSEY, DECEMBER 21, 1932. N. J. Agr. Expt. Sta. Bull. 552, 78 pp. [New Brunswick.] 1933.

Partial contents: Land-Use Policies and Programs in the United States, by A. R. Mann; Some of the Elements of a State Land-Use Program, by L. C. Gray; Land Use and Soil Erosion, by H. H. Bennett; The Land Resources of New Jersey, by L. L. Lee; Urban and Suburban Land Problems, by J. K. Powell; Can the Utilization of Idle Land Be made a Factor in the Reduction of Delinquency? by Calvin Derrick; Financing Home Ownership, by F. G. Stickel, Jr.; Parks and Forests, by C. P. Wilber.

NEW JERSEY STATE PLANNING BOARD.

(2704)

FIRST ANNUAL REPORT OF PROGRESS . . . PLANNING SURVEYS AND PLANNING STUDIES FOR NEW JERSEY. 147 pp., illus. [Trenton, N. J.] 1935.

This report is in seven parts, part four of which is entitled "Physical Conditions and Land Use, Including Soil Erosion and Agricultural Problem Areas."

NEW MEXICO STATE PLANNING BOARD.

(2705)

PROGRESS REPORT TO NATIONAL RESOURCES BOARD . . . APRIL 15, 1935. 334 pp. [Santa Fe, N. Mex.] 1935. [Mimeographed.]

This report embodies the work of the State planning board staff since July 1934 and is a continuation of a preliminary report of December 15, 1934. Partial contents: Land Utilization (Land Grants, Homestead Acts, Reclama-

tion and Irrigation, Problem Areas, Publicly Owned Land), pages 40-47; Erosion, pages 48-58; Wind Erosion, pages 72-75; County Zoning, pages 76-82; Timber Resources, pages 83-88; Digest of Agricultural Conditions in the Rio Grande Valley of New Mexico, pages 126-129; Recreation, pages 295-302.

NEW YORK STATE PLANNING BOARD.

(2706)

STATE PLANNING FOR NEW YORK. SUMMARY REPORT OF PROGRESS TO GOVERNOR HERBERT H. LEHMAN. 92 pp., illus. January 1935.

Partial contents: Population; Land Use (Decline in Farm Acreage, Land Classification Studies, a State Policy Needed for Submarginal Lands, Continuation of Land Use Survey, Base Maps, Soil Erosion, Local Government and Land Utilization); Forests (Reforestation); An Enlarged Public Domain; Waters (the Upland Watersheds, etc.); Mineral Resources; The Highways; State Planning Objectives and Administration.

NEW YORK STATE PLANNING COUNCIL.

(2707)

A REPORT TO THE GOVERNOR . . . BY THE NEW YORK STATE PLANNING COUNCIL FOR THE DIVISION OF STATE PLANNING IN THE EXECUTIVE DEPARTMENT, FOR THE PERIOD ENDING JUNE 30, 1936. 95 pp., illus. (Albany.) 1937.

This report on water resources, highway development, public works, and land use, discusses soil erosion and reforestation, pages 72-76.

OREGON STATE PLANNING BOARD.

(2708)

WATER SOURCES AND WATER SHED PROTECTION PROBLEMS OF OREGON MUNICIPALITIES. 26 pp., illus. (Portland). February 15, 1937. [Mimeographed.]

A preliminary survey of sources of municipal water supplies and the problems of protecting municipal watersheds in Oregon. The report discusses the principal features and difficulties of these problems and suggests methods for their solution. Maps showing Oregon's municipal water sources and watersheds are included. Grazing on watersheds and its erosive effects are described, pages 9-11.

OSBORN, BEN, AND WHITAKER, H. L.

(2709)

RECONNAISSANCE MAPPING OF NATURAL VEGETATION OF CENTRAL GREAT PLAINS REGION. Soil Conserv. 2: 181-186, illus. February 1937.

The work incident to reconnaissance mapping of natural vegetation is described. They state that the same methods could be used in other regions where sufficient relics or records of the original vegetation remain to show the distribution of the dominants of the various communities.

PACK, A. N.

(2710)

LAND USE PLANNING. Nature Mag. 26: 237-238, illus. October 1935.

States that the work of the National Resources Committee is handicapped owing to the uncoordinated programs of Government bureaus connected with resources and conservation and especially points out the difficulties encountered by the land-use committee of the New Mexico State Planning Board.

PASCHALL, A. H., AND CONREY, G. W.

(2711)

CROP DISTRIBUTION IN RELATION TO SOIL TYPES IN SOUTHEASTERN OHIO. Amer. Soil Survey Assoc. Bull. 15: 66-68. 1934.

"Poverty grass and broome sedge grow luxuriantly in pasture on sandstone and shale soils where the soil is distinctly acid and sheet wash may have resulted in a considerable loss of surface soil."

— AND REED, E. H.

(2712)

EVALUATING EFFECTS OF SOIL TYPE, SLOPE, AND EROSION ON PRODUCTIVITY. Soil Conserv. 1: 8. December 1935.

"The soils and erosion control practice divisions of the Salt Creek watershed project, Ohio, have devised a system which gives proper weight to soil type, slope, and erosion as factors in crop production."

PECK, MILLARD, FRANK, BERNARD, AND EKE, PAUL A.

(2713)

ECONOMIC UTILIZATION OF MARGINAL LANDS IN NICHOLAS AND WEBSTER COUNTIES, WEST VIRGINIA. U. S. Dept. Agr. Tech. Bull. 303, 64 pp., illus. 1932.

"The first objective of the investigation reported in this bulletin is to show which type of land should be used for agriculture and which for

forestry and to try to point out the conditions that will determine whether land not easily classified as farm land or forest land should be used for a different type of farming or for a different combination of agriculture and forestry. The second objective is to indicate lines of improvement in the utilization of both farm and forest lands, and the relation of such changes in utilization to the social institutions of the area, particularly the schools and roads."

PENNSYLVANIA STATE PLANNING BOARD.

(2714)

PRELIMINARY REPORT . . . TO THE NATIONAL RESOURCES BOARD. 682 pp., illus. [Harrisburg.] 1934. [Multigraphed.]

A chapter entitled "Soil Erosion in Pennsylvania," by A. L. Patrick, appears on pages 97-102.

PETTET, Z. R.

(2715)

CENSUS MINOR CIVIL DIVISION STATISTICS AVAILABLE FOR LAND USE PLANNING.

U. S. Resettlement Admin. Land Policy Cir. pp. 16-17. January 1937.

"Some 50,000 townships, precincts, or other minor civil divisions which have agricultural operations, have been tabulated separately by the Bureau of the Census including nearly all of the information obtained in the 1933 enumeration. This information covers the entire range of land use, acreage and production of major crops, major classes of livestock and poultry."

POWELL, JOHN W.

(2716)

REPORT ON THE LANDS OF THE ARID REGION OF THE UNITED STATES. 195 pp. illus. Washington, Govt. Print. Off. 1879.

This report presents what purports to be a coherent program for the proper utilization of the Great Plains, recognizing the necessity of adjustment to natural environment.

PRATT, J. H.

(2717)

THE CONSERVATION AND UTILIZATION OF OUR NATIONAL RESOURCES. Jour. Elisha Mitchell Sci. Soc. 26: 1-25, illus. April 1910.

The natural resources of North Carolina are named, including soils and soil products. "The preservation of forests, which are one of the natural products of our soils, is one of the most important problems that now confronts the State." The need for adequate protection of young forest growth is stressed. Erosion in different sections is discussed. "There are two methods by which this loss of soil can be very materially lessened and in some instances entirely prevented: (1) Deeper plowing; and (2), terracing." Mineral products, drainage of swamplands, water power, and the fishing industry are considered.

PRESTON, R. J.

(2718)

PLANNING COMES TO THE TENNESSEE VALLEY. Jour. Forestry 34: 1033-1038. December 1936.

"The misuse of the resources with which this valley was endowed has gutted the once fertile land with gullies and worn out the soil . . . If successful, the work of the TVA may prove an epoch-making event."

RAISZ, ERWIN, AND HENRY, JOYCE.

(2719)

AN AVERAGE SLOPE MAP OF SOUTHERN NEW ENGLAND. Geogr. Rev. 27: 467-472, illus. July 1937.

Describes a map similar to the relative relief map of Ohio by Guy Harold Smith which is said to have called attention in the United States to the problem of defining quantitatively the average slope of the land. Not examined.

RAMSER, C. E.

(2720)

FEDERAL SOIL EROSION RESEARCH PROJECTS. Agr. Engin. 10: 277-281. September 1929.

The details of a general provisional program for soil erosion investigation, formulated on March 12, 1929, are set forth, with a reconnaissance map of regional soil erosion areas. Experimental work near Guthrie, Okla., and Temple, Tex., is discussed.

RAUP, H. F.

(2721)

LAND-USE AND WATER-SUPPLY PROBLEMS IN SOUTHERN CALIFORNIA: MARKET GARDENS OF THE PALOS VERDES HILLS. *Geogr. Rev.* 26: 264-269, illus. 1936.

The area known as the San Pedro Hills on the Palos Verdes Hills, 20 miles southwest of Los Angeles, has no need of irrigation. "The profile of the hills presents a series of remarkably well preserved marine terraces . . . Without the terraces the hill slopes would be too steep for successful agriculture." The critical climatic factors and the historical development of these terraces are discussed. "We have here an interesting example of delicately balanced agriculture possible only because of careful attention to the conservation of the available rainfall."

RENNER, F. G.

(2722)

EROSION STUDIES UNDER WAY IN SOUTHERN IDAHO. *Forest Worker* 7: 10. March 1931.

The acute erosion problem in southern Idaho is traced to soils of loose, coarse, granite sand. Livestock grazing was reduced in an effort to check further erosion but was found not to keep pace with soil losses or cover depletion. Experimental work in several phases of the problem has been started by the Intermountain Forest and Range Experiment Station.

RINGLAND, A. C.

(2723)

"BONIFICA INTEGRALE," THE ITALIAN NATIONAL PLAN OF LAND UTILIZATION. U. S. Forest Service. 50 pp., illus. 1933. [Mimeographed.]

"The following summary of a more detailed report is a boiled-down factual exposition, without embroidery or speculation, designed simply to emphasize and demonstrate the policies and principles of a national plan of land utilization in actual course of execution. It is a plan which in its integration alone is patently suggestive for American consideration and application. Our unrelated land policies and ill-coordinated practices in their historic sequence reveal the same disastrous results which are apparent in many parts of Italy. The Italians are now profiting by past experience: Their land plan and work is wholly coordinated, linking the state and private enterprise—there is unity of conception and unity of execution in the purpose to be served. This purpose is the utilization of the land, and all means to that end are centered and subordinated to the direction of the Ministry of Agriculture and Forests."—Foreword.

RUSSELL, W. M.

(2724)

DEVELOPMENT OF LAND USE ADJUSTMENT PROJECTS. U. S. Resettlement Admin. Land Policy Cir. 3: 10-14. June 1937.

Summarizes some of the work undertaken during the period November 1935 through April 1937 and indicates the varied improvements under way on 94 projects.

SAUER, C. O., LEITH, C. K., MERRIAM, J. C., AND BOWMAN, I.

(2725)

PRELIMINARY RECOMMENDATIONS OF THE LAND-USE COMMITTEE RELATING TO SOIL EROSION AND CRITICAL LAND MARGINS. *Sci. Advisory Bd. Rept.* 1933-34 (App. 8): 135-161. Washington, D. C. 1934.

"The two research programs which are herewith recommended to be undertaken are: (1) An investigation of the relations of surface, soil, and climate with the control of soil erosion and soil wastage as its objective . . . (2) An investigation of critical land margins and their hazards, with emphasis on precise localization through the mapping of their constituent risk elements. These two programs are outlined in detail on the following pages."

SCHICKELE, R., AND HIMMEL, J. P., IN COOPERATION WITH IOWA AGRICULTURAL EXPERIMENT STATION.

(2726)

PROBLEMS OF LAND TENURE IN RELATION TO LAND-USE ADJUSTMENTS. *Land-use Planning* Pub. 9. 47 pp., illus. Washington, D. C. 1936. [Mimeographed.]

This study, undertaken in the Tarkio Creek erosion control demonstration area in southwestern Iowa, "attempts to analyze the effects of various forms of land tenure on land-use patterns and related farming practices. This highly complex problem is studied from the viewpoint of group behavior of farmers under specified conditions of land types and institutional arrangements rather than from the viewpoint of individual farm management."

SCHREINER, O.

(2727)

SOIL EROSION WORK IN THE UNITED STATES. 4th Pacific Sci. Cong., Java, Proc. 4: 409-418, illus. 1929.

As a result of soil survey work concerning the location of eroded lands "eighteen distinct areas have been roughly outlined and estimates made of the extent of erosion in these regions." Referring to the large amount of work on the prevention and control of soil erosion done by many other agencies the writer says: "The time has now arrived when all this information should be brought together and correlated with a view to working out national plans for a study of the methods of erosion control." Funds for soil erosion research, location of field stations, and research at field stations, are among topics considered.

SCUDDER, H. D., AND HURD, E. B.

(2728)

GRAPHIC SUMMARY OF AGRICULTURE AND LAND USE IN OREGON; PRELIMINARY ISSUE OF SELECTED MAPS AND GRAPHS. Oreg. Agr. Expt. Sta. Cir. 114, 39 pp., illus. 1935.

SHELLABY, R. K.

(2729)

BIRD MAPS FOR SOIL SAVERS: THE MODERN PROFESSION OF PHOTOGRAMMETRY PERMITS SURVEYING OF VAST AREAS FROM THE AIR, SIMPLIFIES THE WORK OF CONSERVATIONISTS, AND LEAVES GROUND CREWS TO PLOD ALONG 10 TO 20 TIMES SLOWER. Christian Sci. Monitor, Weekly Mag. Sec., pp. 8-9, illus. May 27, 1936.

Describes aerial-photography methods of map making from the air over Navajo, Gila, and Rio Grande Valley soil conservation projects, with 10-lens camera for large areas.

SINCLAIR, J. D.

(2730)

STUDIES OF SOIL EROSION IN MISSISSIPPI. Jour. Forestry 29: 533-540. April 1931.

In a survey of nine representative counties of Mississippi the author found 27.7 percent of the area actively eroding, owing largely to improper land use. Some historical background on erosion is given indicating its extent, and causative land uses. The impairment of valley lands due to erosion on the uplands is emphasized and reforestation as a remedy is indicated.

SINTERLEY, J. H., MOORE, H. R., AND FALCONER, J. I.

(2731)

LAND UTILIZATION IN A SOUTHEASTERN OHIO COUNTY. Ohio Agr. Expt. Sta. Bull. 485, 38 pp., illus. 1931.

"In the poorer areas of the Lake States, a rapidly mounting rate of tax delinquency has focussed attention upon the problem of marginal lands." The authors present the results of a study which should help to solve these problems in southeastern Ohio and serve as a basis for further studies in marginal and submarginal areas. In conclusion the authors think that large areas of land seem unable to support a system of agriculture that will yield a living and support the functions of local government. "The present and future use of these idle and abandoned areas may well be considered in any State conservation and forestry program."

—, MOORE, H. R., AND FALCONER, J. I.

(2732)

LAND UTILIZATION IN LAWRENCE COUNTY, OHIO. Ohio Agr. Expt. Sta. Bull. 514, 48 pp., illus. 1932.

The purpose of this study has been to picture the different ways in which the less favorable agricultural areas of the State are adjusting themselves to the economic and social changes of the past and present century. "How to make adjustments to meet these changes has been a problem for all agricultural regions."

SMITH, J. R.

(2733)

NORTH AMERICA. 849 pp., illus. New York, Harcourt, Brace & Co., Inc. 1925.

The writer attempts to give a thorough knowledge of land conditions and natural resources on the American continent. Conditions in the United States, Canada, Mexico, and Central America are reviewed. Soil conservation and related subjects are considered throughout the text.

SMITH, J. R.

(2734)

THE SOUND USE OF LAND AND WATER. Survey Graphic 24: 63-67, illus. February 1935.

"In the report of the National Resources Board and that of the Mississippi Valley Committee we have for the first time the rock-bottom of our national planning in terms, not only of soil and rainfall, but of the distribution of energy and in the phrase of the President's message, 'the security of livelihood through the better use of the natural resources of the land in which we live.' These surveys, surveyed by an economic geographer who has explored as no other writer the promise of human life on the North American Continent."—Editor's Note.

SOUTH DAKOTA STATE PLANNING BOARD.

(2735)

AGRICULTURAL RESOURCES; A PRELIMINARY REPORT. 166 pp., illus. [Brookings, S. Dak.] January 1, 1936. [Mimeographed.]

Partial contents: Land Tenure and Ownership, pages 88-112; The New Public Domain (includes a plan for the administration of the public domain), pages 113-115; Land Use and Conservation, pages 116-138; Rehabilitation (Need and Methods), pages 139-142; Soil Erosion, pages 143-150; Summary and Conclusions, pages 159-166. Tables show ownership classification of land in South Dakota counties as of March 1, 1934.

(2736)

UPPER MISSOURI ASSOCIATION URGES PROGRAM FOR DEVELOPMENT OF RIVER SYSTEM. S. Dak. State Planning Bd. Prog. Rept. 3: 1-3. April 24, 1937. [Mimeographed.]

Numerous projects designed to promote irrigation, transportation, stream and run-off control, erosion control, and restoration of grass and forest lands along the Missouri River and its tributaries were recommended in a resolution adopted at a meeting in Yankton, April 15, 1937, of the Upper Missouri Water Conservation Association. Text of resolution adopted is included.

(2737)

WATER RESOURCES OF SOUTH DAKOTA. 69 pp., illus. June 1, 1935. [Mimeographed.]

This preliminary report deals with distribution of water resources and problems of water use and control. A tentative program for a 10-year plan for South Dakota water resources is presented. Drainage of lands for agricultural purposes and measures for flood control are discussed.

Literature cited, pages 68-69.

STEVENS, R. E.

(2738)

SOIL EROSION PRESENTS HUGE PROBLEM. Minn. Conserv. 1933: 12-16, illus. November 1933.

In southeastern Minnesota, where the problem of soil erosion is rife, nine Emergency Conservation Work camps were established and nearly 2,000 young men employed. The writer tells what erosion is, the damage it does, and preventive methods which have been developed to check it. He describes the work done at soil experiment stations and demonstrations made in soil-erosion control, and concludes: "It is to be hoped that when these soil experiment stations have worked out a definite program as the result of their research, that the government and the people will not lag in putting these findings into effect as they have in regard to their forests."

STEWART, GEORGE, AND HUTCHINS, S. S.

(2739)

THE POINT-OBSERVATION-PLOT (SQUARE-FOOT DENSITY) METHOD OF VEGETATION SURVEY. Jour. Amer. Soc. Agron. 28: 714-722, illus. September 1936.

"This paper explains the working of the new point-observation-plot method of vegetation survey which has evolved over a period of 4 years . . . Its application extends throughout the fields of range management, pasture management, agronomy, and soil erosion. It provides definitely quantitative data instead of merely qualitative. The new method is founded on the technic long used by plant breeders . . . It includes randomization and replication of plots and, therefore, lends itself readily to statistical analysis. In addition, it has been modified to include some phases of the timber survey and certain refinements of the range reconnaissance survey long used by the Forest Service and other organizations."

- STRICKLER, P. B. (2740)
CASH WASHED INTO CREEKS. Wallaces' Farmer 60: 8. August 17, 1935.
Data from the Bethany erosion farm are cited to prove the author's contention that soil losses on many farms exceed their crops in value. A proper policy of land utilization is proposed to alleviate this waste.
- TAYLOR, C. C. (2741)
ATTAINING A NATIONAL POLICY AND PROGRAM OF CONSERVATION. Rural Amer. 14: 3-7. December 1936.
A survey is made of Government and State organizations established for the purpose of conserving natural resources, having their origin in President Theodore Roosevelt's administration. The President is quoted: "When soil is gone, men must go, and the process doesn't take long." Important changes indicating that America's pioneering era is over and that America must now decide on future issues through coordination of various State, Federal, and voluntary activities "into a National, dynamic, conservation movement" are considered.
- TAYLOR, W. P. (2742)
WHAT IS ECOLOGY AND WHAT GOOD IS IT? Ecology 17: 333-346. July 1936.
Partial summary: "Harmonious and satisfactory land use and efficient conservation of natural resources can be obtained only through programs based on a sound ecological foundation. Ecology is one of the most useful and essential of the sciences, in at least the following fields: soil conservation, land classification and planning, resettlement projects, all the farm sciences . . . practically all phases of conservation of natural resources, reforestation, range rehabilitation, wildlife management . . . and the social sciences."
Literature cited, pages 345-346.
- TENNESSEE VALLEY AUTHORITY. (2743)
THE DEVELOPMENT OF THE TENNESSEE VALLEY. 15 pp., illus. Washington, Govt. Print. Off. 1936.
A brief outline of the T. V. A. program and objectives in water conservation, stream regulation, erosion control, and land utilization.
- (2744)
THE UNIFIED DEVELOPMENT OF THE TENNESSEE RIVER SYSTEM. 105 pp., illus. 1936.
Erosion control and land-use problems are discussed in connection with the ultimate purpose of the Tennessee Valley Authority, pp. 49-54.
- TEXAS STATE PLANNING BOARD. (2745)
REPORT OF THE TEXAS PLANNING BOARD FOR PERIOD ENDING DECEMBER 31, 1935. 103 pp., illus. [Austin, Tex.] 1935.
A discussion of soil and natural vegetation appears on pages 39-43.
- THROCKMORTON, R. I. (2746)
REGIONAL LAND USE FOR THE HARD RED WINTER WHEAT BELT. Jour. Amer. Soc. Agron. 28: 165-172. March 1936.
The author presents a regional land-use program for the hard red winter wheat belt with the following points considered: (1) The region is adapted to extensive farming which encourages a speculative agriculture; (2) need for soil and water conservation; (3) large wheat acreage increase since 1900; (4) much unsuitable land has been placed under cultivation; (5) total wheat area should be reduced about 20 percent; (6) acreage removed from wheat should be used for soil-improving crops of various kinds as designated by soil needs; (7) need for the development or introduction of a grass or grasses for reestablishment of sod on sandy areas and on sloping and rolling lands.
- TOLLEY, H. R. (2747)
CONSERVING OUR SOIL RESOURCES FOR FUTURE GENERATIONS. Nation's Agr. 11: 16-17, 19. April 1936.
A discussion of the projected agricultural program with especial emphasis on soil erosion and depletion problems.

TOPHAM, P.

(2748)

NOTES ON SOIL EROSION IN THE UNITED STATES. Oxford Univ. Imp. Forestry Inst. (Paper 8), 29 pp., illus. 1937. [Mimeographed.]

This is a report on a tour made in January and February 1937, with the aid of a grant from the Carnegie Corporation of New York. The following districts were visited: The Piedmont of North Carolina and South Carolina, parts of Mississippi, eastern Texas, and the Tennessee Valley. Government policies in soil conservation and flood control are discussed.

TUGWELL, R. G.

(2749)

DOWN TO EARTH. Current Hist. 44: 33-38. July 1936.

The writer points out that the land problem is one of adjustment involving "careful analysis of the relation of different kinds of soil to the crops it will easily and harmlessly support, and the bringing of farm and grazing practices into harmony again with natural requirements. It involves, also, not the depopulation of all hilly regions or a return of the entire Great Plains area to grass, but rather learning how to use hills and plains in ways to which nature has no objections."

(2750)

FARM RELIEF AND PERMANENT AGRICULTURE. Ann. Amer. Acad. Polit. and Social Sci. 142: 271-282. March 1929.

Various stages of agriculture with resulting changes in Europe and the United States are traced. "The probabilities for the new agriculture are, then, that there will be more legumes and grasses, and a reduced cereal culture, particularly less corn; it will have more animals in larger groups; it will have more trees, especially of the food-bearing sorts; it will be carried on in larger units, but on less land and with a smaller personnel; it will be more highly capitalized; there will be fewer proprietors and more workers . . ." The McNary-Haugen bills for relief of present agricultural distress are given attention.

(2751)

OUR NEW NATIONAL DOMAIN. Scribner's Mag. 99: 164-168. March 1936.

Outlines the history of public lands in the United States and describes conditions on forest, grazing, and croplands which have brought about the economic necessity for conservation of soils. "The creation and improvement of our new national domain, as a supplement to the efforts of private individuals, and a storehouse for the national heritage of our land resources, remains one of the major tasks of the coming years."

(2752)

THE PLANNED USE OF LAND. Today 1: 6-7, 23-24, illus. January 20, 1934.

In discussing the program of the Agricultural Adjustment Administration the author states that the people must recognize and regard land-use planning as one of the central and controlling elements in our whole national economy. The plight of farmers living on eroded or submarginal farms is discussed. Three great areas of limited productive capacity are described, namely, the Appalachian Highland of the eastern part of the United States; the Great Lakes region; and the western border of the Great Plains.

UNITED STATES BUREAU OF CHEMISTRY AND SOILS.

(2753)

SOIL EROSION INVESTIGATIONS. U. S. Bur. Chem. and Soils Ann. Rept. 1932: 25-28. 1932.

Accomplishments since the formulation of a definite plan for national programs of research on basic principles of soil-erosion processes and on methods of erosion control are cited, as arousing farmers and agricultural specialists to a realization of the cost of this form of continuous land depreciation and starting practical methods of slowing down the wastage in regions where previously nothing was being done.

UNITED STATES BUREAU OF SOILS.

(2754)

SOIL SURVEYS. U. S. Bur. Soils and Bur. Chem. and Soils Repts. 1899-1937, illus. Washington, Govt. Print. Off.

These reports, published 1899-1922 annually as Field Operations of the Bureau of Soils were subsequently published separately as Soil Survey Reports by the Bureau of Chemistry and Soils. They contain numerous

observations on soil erosion by soil types and much information pertaining to geographic distribution of erosion and cover every State in the Union. Many of them are prepared in cooperation with State agricultural experiment stations.

[UNITED STATES] NATIONAL RESOURCES BOARD.

(2755)

A REPORT ON NATIONAL PLANNING AND PUBLIC WORKS IN RELATION TO NATURAL RESOURCES AND INCLUDING LAND USE AND WATER RESOURCES WITH FINDINGS AND RECOMMENDATIONS, DECEMBER 1, 1934. 455 pp., illus. Washington, Govt. Print. off. 1934.

"This report of the President's National Resources Board brings together, for the first time in our history, exhaustive studies by highly competent inquirers of land use, water use, minerals, and related public works in relation to each other and to national planning."

(2756)

STATE PLANNING—A REVIEW OF ACTIVITIES AND PROGRESS. 310 pp., illus. Washington, Govt. Print. Off. 1935.

This report shows the growth of State planning and demonstrates the importance of State responsibility for planning endeavor. Part 1 is a résumé of the development of State planning; part 2 consists of reports from each State; part 3, activities of State planning boards. Soil erosion is treated under "Land Planning," pages 137-184.

— LAND PLANNING COMMITTEE.

(2757)

SOIL EROSION: A CRITICAL PROBLEM IN AMERICAN AGRICULTURE. U. S. Natl. Resources Bd., Land Planning Com., Sup. Rept., pt. 5, secs. 1-11, 112 pp. 1935.

Contents: The Crisis in Land Utilization; The Process of Soil Erosion; The Effects of Soil Erosion; National Erosion Reconnaissance; Erosion Conditions in the United States; Erosion Control Demonstration on a National Scale; a National Policy of Erosion Control; The Future of Erosion Control; Erosion Conditions by States; Engineering Aspects of Erosion Control; Farm Organization and Related Facts for Selected Areas in Erosive Regions.

[UNITED STATES] NATIONAL RESOURCES COMMITTEE.

(2758)

DRAINAGE BASIN PROBLEMS AND PROGRAMS. 540 pp., illus. Washington, Govt. Print. Off. 1937.

"The investigation on which the report is based was undertaken . . . with a view—(1) to determining the principal water problems in the various drainage areas of the country; (2) to outlining an integrated pattern of water development and control designed to solve those problems; (3) to presenting specific construction projects and investigation projects as elements of the integrated pattern or plan, with priorities of importance and time."

(2759)

DRAINAGE POLICY AND PROJECTS. Report of the Special Subcommittee of the Water Resources Committee of the National Resources Committee, 22 pp., illus. January 1936. [Mimeographed.]

Reviews the findings of the subcommittee on the following subjects: (1) The nature of drainage work in which the Federal Government is now engaged; (2) the conflicts of activity which have arisen among both Federal and State agencies with respect to drainage; and (3) formulation of a plan whereby the program of the various agencies may be reconciled currently with the view to eliminating conflicts and of increasing the general utility of each program.

(2760)

PROGRESS REPORT WITH STATEMENTS OF COORDINATING COMMITTEES, JUNE 15, 1936. 61 pp., illus. Washington, Govt. Print. Off. 1936.

"To sum up the work of the National Resources Committee on public works—it has prepared and is revising lists of water projects, scientific research projects, and general public works showing recommended order of priority, and is now engaged on an extensive study into the problem of allocating the costs among Federal, local, and private parties." Land and water use are considered on pages 6-13.

[UNITED STATES] NATIONAL RESOURCES COMMITTEE.

(2761)

PUBLIC WORKS PLANNING. 221 pp., illus. Washington, Govt. Print. Off. 1936.

"This report on Drainage Basin Problems and Programs, constituting Part II of this statement, represents a first attempt through the joint efforts of Federal, State, and local agencies, official and unofficial, to formulate a national water plan and program. Project lists embodied in that report provide a reservoir of undertaking intended to cover a period of 10 or more years. They have been selected as parts of the ultimate plan of development for the drainage basin in which they are located without reference to Federal or non-Federal financing." The foregoing quotation is from an introductory letter from Harold L. Ickes to President Roosevelt. Soil erosion projects are listed for regions throughout the country, and estimates are given on costs of erosion studies for 5 years, as well as total costs of coastal erosion studies.

(2762)

REGIONAL FACTORS IN NATIONAL PLANNING AND DEVELOPMENT. 223 pp., illus. Washington, Govt. Print. Off. 1935.

This report deals with problems of planning and development which overlap State lines or which require the use of combined Federal and State powers. "One advantage of having variable rather than fixed regional boundaries is that each specific problem can be handled by the regional planning office with regard to the actual area affected. When two or more problems interlock—as, for example, flood control, soil erosion, and power—the office can handle the problem of their interrelationship with regard to the area concerned in the interrelationship."

(2763)

REGIONAL PLANNING. PART I—PACIFIC NORTHWEST. 192 pp., illus. Washington, Govt. Print. Off. 1936.

A study of the Columbia River Basin's natural resources and possibilities for power development. On pages 54-55, under "Land Resources," some consideration is given to the problem of soil erosion in the wheat-growing areas of eastern Oregon and Washington. Land classifications and soil surveys are being made by the Resettlement Administration.

(2764)

REGIONAL PLANNING. PART II—ST. LOUIS REGION. JUNE 1936. 68 pp., illus. Washington, Govt. Print. Off. 1936.

Contents: Recommendations of the National Resources Committee; Report of the St. Louis Regional Planning Commission.

(2765)

REGIONAL PLANNING. PART III—NEW ENGLAND. 101 pp. Washington, Govt. Print. Off. 1936.

This report on studies of population, land resources, transportation, industry, and water resources in New England discusses the findings of the Soil Conservation Service in soil-erosion research, page 30.

(2766)

STATE PLANNING: PROGRAMS AND ACCOMPLISHMENTS. 128 pp. Washington, Govt. Print. Off. 1937.

"This report contains authorized statements of State planning and regional planning boards. It records the notable advance made by these agencies during the last few years."

(2767)

WATER-RESOURCE STUDY BEGUN ON NATION-WIDE SCALE. Engin. News-Rec. 116: 726-727. May 21, 1936.

Contains extracts from paper by Abel Wolman, presented before joint planning conference in Richmond, Va., May 4, 1936. Extracts contain objectives of survey and list of all drainage basin districts thus far organized and water consultants assigned to them. "A detail survey of the utilization and planning of water resources in the country's major drainage basins is being carried out in cooperation with State and Regional Planning Boards."

UNITED STATES RESETTLEMENT ADMINISTRATION. (2768)
 GREAT PLAINS COMMITTEE HOLDS HEARINGS. U. S. Resettlement Admin. Land Policy Cir. pp. 2-4. December 1936.

"The duty of the Great Plains Committee, appointed by the President, is to report on a long-term program for the rehabilitation of that area. The hearings were consequently focused not so much upon immediate problems as upon the long-term policies which appear necessary in order to protect the land, conserve the water, and place the economy of the region upon a firmer footing." Proposals for the control of absentee-owned land in order to prevent wind erosion on unoccupied tracts were included in most of the resolutions.

INTERIM REPORT, APRIL 1936. 34 pp., illus. Washington, Govt. Print. Off. 1936. (2769)

This report is presented as a partial summary of activities to April 1936. L. C. Gray states, pages 1-7, that: "The program of the Land Utilization Division of the Resettlement Administration . . . is the first program aimed primarily not at acquiring land for a special purpose but at correcting the misuse which has gone on through the years." The program ". . . has been developed to deal with what has come to be popularly known as the submarginal land problem." Conservation work on the submarginal lands acquired by purchase include tree planting, constructing check dams or terracing to correct erosion, stream improvement, and the restoring of range grasses.

LAND-USE PROJECTS UNDER WAY IN RESETTLEMENT ADMINISTRATION REGIONS. U. S. Resettlement Admin. Land Policy Cir., pp. 11-14. June 1936. (2770)

Contains information concerning land-use project activities in regions 7, 8, and 9. Activities include recommended cropping system studies for Nebraska, surveys of land ownership and land use in North Dakota, underground-water-resources analyses in Oklahoma and Texas, and irrigation surveys in Arizona.

NEW PROJECTS BEING UNDERTAKEN IN VARIOUS STATES. U. S. Resettlement Admin. Land Policy Cir., pp. 4-5. May 1936. (2771)

Reports plans for reconnaissance survey of eastern Arkansas (region 6), for collection of data on drainage and backwater conditions and soil fertility, data to be used in land-use planning study by Arkansas Agricultural Experiment Station, Bureau of Chemistry and Soils, Federal Land Bank of St. Louis, and the Soil Conservation Service. Reports also land classification program to be projected July 1936, in Minnesota (region 2).

UNITED STATES SOIL CONSERVATION SERVICE. (2772)
 PROCEDURE FOR MAKING SOIL CONSERVATION SURVEYS. Outline 4, 32 pp., illus. 1936.

This handbook contains instructions for making soil-conservation surveys. These surveys embrace the designation of four factors, namely (1) character and degree of erosion, (2) present land use or cover, (3) percent and class of slope, and (4) soil.

RECONNAISSANCE EROSION SURVEY DATA. 1934. U. S. Soil Conserv. Serv. S. C. S.-MP-2, 48 pp. July 1935. [Mimeographed.] (2773)

Summarizes erosion conditions in the United States and includes a separate table for each State. Considerable data on erosion conditions in the Nation by classes are also given.

UTZ, E. J. (2774)
 PLANNING FOR SOIL AND WATER CONSERVATION. Soil Conserv. 2: 256-259, illus. May 1937.

"A major consideration in planning is the determination of proper land use." The author favors the idea of making the land-use plan according to specific prevailing conditions.

VIRGINIA STATE PLANNING BOARD.

(2775)

TENTATIVE REPORT OF THE VIRGINIA STATE PLANNING BOARD ON PART IX—LAND USE, AND PART VI—AGRICULTURE. 136 pp., illus. May 1, 1936. [Mimeographed].

This report points out factors affecting land-use planning for agricultural purposes. Under part IX, pages 44-45, an outline and summary of the Soil Erosion Service reconnaissance-erosion survey made in 1934 is given. Considerable data are also given on a survey made by the Virginia Land-Use Committee. The recommendations for erosion control issued by the State Agricultural Extension Service are summarized.

WALKER, H. B.

(2776)

AN ENGINEER'S VIEW OF LAND-USE PLANNING. Agr. Engin. 17: 114-119. March 1936.

"Land is a basic resource, and, as such, it should be inventoried through adequate soil survey methods for a fundamental land-use foundation . . . natural resources constitute basic resources to be systematically inventoried, and it is upon these that sound land-use programs are built." The author discusses land-use programs, which "must be evolutionary rather than revolutionary"; soil conservation, drainage and irrigation problems; new machine applications and performance; agricultural structures, and rural electrification which "is woven into the entire agricultural engineering fabric of soil conservation, power, machinery, structures, and utilities."

WALKER, R. H., AND BROWN, P. E.

(2777)

SOIL EROSION IN IOWA. Iowa Agr. Expt. Sta. Spec. Rept. 2, 47 pp., illus. April 1936.

The purpose, methods, and results of a reconnaissance soil-erosion survey are herein covered. The survey revealed that only about 13 percent of the total area of Iowa shows little or no evidence of erosion and that approximately 30 billion tons of soil have been washed away since cultivation began. Among the measures recommended for erosion control are contour cultivation, crop rotations, liming acid soils, plowing under crop residues and manures, application of phosphates and other fertilizers, and terracing.

WALLACE, H. A.

(2778)

HOW SHALL WE USE OUR LAND. U. S. Ext. Serv. Rev. 6: 17-18. March 1935.

This is a discussion of the report recently submitted by the National Resources Board, whose broad program the President recommends as a guide to future planning.

(2779)

LAND POLICY. U. S. Dept. Agr. Yearbook 1937: 22-27. 1937.

Discusses Federal submarginal land policies under the Resettlement Administration and the United States Biological Survey.

(2780)

LAND UTILIZATION. U. S. Dept. Agr. Rept. Sec. 1935: 46-54. 1935.

"During the last half century four stages may be distinguished in the evolution of public policy toward agriculture in the United States . . . The fourth stage . . . is the stage of comprehensive agricultural planning." Research in land use, and the joint responsibility of both State and Federal public bodies in the development of a national land policy, are discussed. The findings of the land planning committee of the National Resources Board provide a solid basis for public policy. Wide ramifications of the problem are also considered.

(2781)

LAND UTILIZATION PROBLEMS. U. S. Dept. Agr. Rept. Sec. 1934: 63-69. 1934.

"Essential to the welfare, not only of agriculture but of the Nation as a whole, is a better land-utilization policy. This involves systems of land tenure as well as of land use. It is concerned with all the principal land uses, including farming, forestry, recreation, and wild-life conservation." The withdrawal of land unsuited to farming is discussed. Soil-depleting practices and methods to control them are considered as well as the need for constructive effort to prevent the known wrong uses of land. Some social aspects of land use, the growth of farm tenancy, and the possibilities

of improved tenure conditions are discussed. The results of farm-management studies have great value. The nature of type-of-farming research is described.

WALLACE, H. A. (2782)
NEW FRONTIERS. 314 pp. New York, Reynal & Hitchcock. [1934.]

Under the heading "Putting Our Lands in Order", Chapter XVIII, pages 239-248, the following appears: "We have permitted the livestock men of the West to overgraze the public domain and so expose it to wind and water erosion. Much of the grass land of the Great Plains has been allowed to blow away. Timber land under private ownership has been destructively logged off, without proper provision for leaving seed trees." The history of the land problem, from its inception to the present is discussed. "Land planning is no longer an academic question. A wide use of our land is intimately related to the future of industry and the unemployed. So long as there are more than five million unemployed in the United States, there will be a steady and irresistible push toward the lower living costs of open country. The repeated droughts of the last five years demand special attention to another critical maladjustment. In the Eastern half of the United States, we need national recreational parks . . . Certain large areas of the Great Plains now plowed, should be put down to grass again. By planting the right kind of shrubs and grasses and protecting nestlings from pasturing and mowing, we can work wonders in restoring wild life over considerable areas unfit to farm."

WEHRWEIN, G. (2783)
AGRICULTURE (LAND USE). Wis. Regional Planning Com. Ann. Rept. 1: 201-219, illus. 1935. [Multigraphed.]

Gives a classification of Wisconsin land, a brief history of agricultural land use and the present status of land-use practices. Soil erosion prevention is given first consideration under land-use problems. An outline of work in the southwestern and western Wisconsin soil erosion area is reviewed.

WELLS, O. V. (2784)
COUNTY PLANNING MEETINGS SUGGEST CHANGES IN CROPPING PRACTICES. U. S. Ext. Serv. Rev. 7: 179. December 1936.

Work of the county agricultural adjustment planning project, designed to help farmers develop an effective planning procedure in good land use and agricultural conservation, is discussed.

WILLIAMS, CARL. (2785)
THE LAND USE PROBLEMS IN THE SOUTH. Jour. Forestry 30: 276-283. March 1932.

A comprehensive review of the land-use situation is presented. The author discusses farming changes that affect land abandonment and sets forth the problem of declining timber production and how the forest-tax problem is related to the comparative desirability of public and private ownership. Recommendation is made for the set-up of State planning commissions, the revision of tax systems, land classification in distressed areas, and the public acquisition of marginal lands.

WILSON, M. L. (2786)
AGRICULTURAL CONSERVATION—AN ASPECT OF LAND UTILIZATION. Jour. Farm Econ. 19: 3-12. February 1937.

Paper read at the twenty-seventh annual meeting of the American Farm Economic Association, Chicago, December 28, 1936. Enumerates a number of lines of action, each involving conservation and all converging on a common point. Recommends the setting up of soil conservation districts in accordance with the Standard State Soil Conservation Districts Law because "such a district can be an efficient institutional agency for the purpose of a land-use program at the same time that it can carry out to the full the principles of economic democracy in agriculture."

WINTERS, N. E. (2787)
THE OKLAHOMA SOIL EROSION SURVEY. Okla. Agr. Expt. Sta. Cir. 79: 9-10. 1931.

A paper read at the second Southwest Soil and Water Conservation Conference. Describes a soil erosion survey of the State by the use of

crop meters. The findings of the survey are summarized, and statistics on erosion are given.

WINTERS, N. E. (2788)

RELATION OF SOIL CONSERVATION TO LAND UTILIZATION IN THE RED PLAINS AREA OF OKLAHOMA. Amer. Soil. Survey Assoc. (Ann. Rept. 15) Bull. 16: 131-135, illus. 1935.

The waste of natural resources through destruction of forests by ax and fires together with overgrazing is pointed out. "As a basis for an intelligent method of procedure in conserving our good soils and economically reclaiming our badly eroded and gullied fields and pastures we must map and classify the soils in a way that will give us the necessary knowledge regarding the several factors which must be considered for the best utilization of each field . . . important factors to be considered are the soil type, the slope of the land, the type and extent of erosion, rainfall and climate, and the present use that is being made of the soil."

WINTERS, R. Y. (2789)

PROBLEMS PERTAINING TO SOIL EROSION IN THE SOUTH. Assoc. South. Agr. Workers Proc. 32: 56-59. 1931.

A paper read at the thirty-second annual convention of the Association of Southern Agricultural Workers. The author discusses the erosion problem in North Carolina and briefly summarizes the results of a cooperative study conducted on Cecil fine sandy loam soil by the Bureau of Roads and the North Carolina Department of Agriculture.

WOLFANGER, L. A. (2790)

NATURAL LAND-USE AREAS AND TYPES OF FARMING IN THE UNITED STATES. Geogr. Rev. 24: 325-326. April 1934.

"The 'Natural land-use' map and the 'Types of farming' study recently published by the Bureau of Agricultural Economics and the Bureau of the Census, respectively, shed an instructive light on the troublesome problem of formulating sound general land utilization policies in the United States." These publications are fully discussed.

WOODWARD, K. W. (2791)

LAND USE IN NEW HAMPSHIRE. Jour. Forestry 34: 975-982. November 1936.

Suggestions are made for the use of tilled areas, pastures, and woods for the next 50 years. It is indicated that "the spector of erosion is not always at the elbow of the farmer, as it is in warmer climates with more open winters." New Hampshire is compared with other States and found to have an unusual variety of conditions—seashore and mountains, fresh and salt water, rivers, lakes, fertile fields of varied soils, and dark forests. Literature cited, page 982.

WRIGLEY, P. I. (2792)

LAND USE IN PENNSYLVANIA. Pa. Agr. Expt. Sta. Bull. 317, 39 pp., illus. 1935.

A sketch is given of pioneer land use to date. Tables show the relative productivity of agricultural land in counties and townships, pages 12-39.

(2793)

LAND UTILIZATION AND FARM MANAGEMENT IN WYOMING COUNTY. Pa. Agr. Expt. Sta. Bull. 257, 40 pp., illus. 1930.

This is one of a series of studies of the more hilly and stony parts of Pennsylvania to determine what constitutes submarginal land. "If a part of the present farm area is destined to be withdrawn from agricultural use, it is important that the fact be recognized as far in advance as possible, in order that heavy investments will not be made in a region where there is no likelihood that they will prove profitable." The survey covers 1 year's investigation of 50 farms.

LEGISLATION

ANONYMOUS. (2794)

ANTI-DUST LAW. Business Week, p. 42. February 27, 1937.

"Black blizzards now are against the law in Kansas. The new statute declares that farmers must take steps whenever top soil starts to drift. Requisite action is outlined as plowing, furrowing, listing, chiseling, or

cultivating or by such other practical methods as have been demonstrated by experience as most effective. If the farmers or their agents don't act, county commissioners are compelled to do the job and may levy an additional tax up to \$1 an acre to cover their expenses."

(2795)

THE FEDERAL SOIL CONSERVATION ACT; SUCCESSOR TO A. A. A. Natl. Wool-Grower 26: 11-12. April 1936.

Includes report of committee on recommendations for a range-conservation program.

(2796)

FLOOD CONTROL. OMNIBUS FLOOD CONTROL BILL PASSED BY THE SENATE AND MISSISSIPPI RIVER BILL APPROVED BY THE HOUSE. Engin. News-Rec. 116: 793. May 28, 1936.

Revised and new provisions added to the flood control bill, placing the Soil Conservation Service of the Department of Agriculture in charge of water-flow retardation and soil-erosion prevention on watersheds, are discussed.

(2797)

LONDON STATUTE FOR CONTROLLING EROSION VOIDED. N. Y. World-Telegram 69: 9. July 22, 1936.

The Kansas erosion law of 1935 was an extension of a law passed in 1913, applying to only a few counties in the State. The Kansas Supreme Court decision, handed down May 26, 1936, found the law compelling the farmer to act, unconstitutional.

(2798)

LET PEOPLE DECIDE IF THEY WANT SOIL CONSERVATION DISTRICTS ACT. (Editorial.) Ariz. Prod. 16: 1, 7-8, illus. April 15, 1937.

Arguments for and against the proposed soil conservation districts law in Arizona, known as Senate bill 207.

(2799)

NEW FLOOD BILLS WOULD CREATE OHIO RIVER AUTHORITY. Engin. News-Rec. 118: 281. February 18, 1937.

The author discusses, among other things, proposed legislation to create a three-man Ohio River Authority and outlines power to use funds for land purchase, reforestation, flood control, and navigation benefits.

(2800)

PENNSYLVANIA ACTS ON FLOOD CONTROL. Amer. Forests 42: 428. September 1936.

Announcement is made of a survey authorized under the Weiss-Andrews bill, the first flood-control measure passed by the special session of the legislature. Two other flood-control measures are summarized.

(2801)

PRESIDENT ROOSEVELT SUGGESTS STATE EROSION PLAN. Save Our Soil 1: 3-4. March 1937.

The western Wisconsin Soil Conservation Association acts to bring about passage of standard State soil conservation districts law in the Wisconsin Legislature.

(2802)

REBUILDING THE DELTA. (Editorial.) Engin. News-Rec. 116: 893. June 18, 1936.

Discusses the Overton flood control bill, which adopts and authorizes the Markham plan to develop "a more effective and workable system of flood bypasses west of the Mississippi delta."

(2803)

THE SOIL CONSERVATION ACT. South. Planter 97: 8, illus. April 1936.

Explains the fundamental purposes of the Soil Conservation and Domestic Allotment Act, signed by the President on February 29, 1936.

ANONYMOUS.

(2804)

SOIL CONSERVATION OR VOTE BUYING. (Editorial.) Calif. Cult. 84: 306. April 24, 1937.

This editorial weighs the purpose of the Supreme Court's invalidation of the processing-tax provisions of the A. A. A. "The true purpose of the act was to provide some real inducement to the farmers of America to quit mining the soil and engage in a soil-building program designed to maintain soil fertility."

(2805)

SOIL CONTROL ACT IS SIGNED BY GOVERNOR. ENABLES FARMERS AND COMMITTEE TO ACCEPT FEDERAL AID TOWARD CONSERVATION PROGRAM. Md. Farmer 21: 5. July 1937.

Act signed by the Governor of Maryland in spring of 1937.

(2806)

SOIL EROSION A BIG PROBLEM. Better Farm Equipment and Methods 4: 20. September 1931.

The legislature of Texas passed one bill and two resolutions relating to soil conservation. The bill "recognizes that soil erosion is the greatest menace to the agricultural lands of the State." Two experiment stations for the study of soil erosion have been established in the Black Belt near Temple and in the east Texas sandy lands near Tyler.

(2807)

STATE COURT UPSETS FLOOD CONTROL PLANS. WASHINGTON SUPREME COURT HOLDS ASSESSMENTS FOR FLOOD CONTROL WORK MUST BE PROPORTIONAL TO BENEFITS RECEIVED. Engin. News-Rec. 116: 895. June 18, 1936.

The Supreme Court ruling is discussed.

(2808)

TREE PLANTING LAW FOR KANSAS. Amer. Forests 43: 248. May 1937.

"Land owners of Kansas will be required to plant shrubs, grasses and trees as means of controlling soil erosion in accordance with an act signed on March 23 by Governor Walter A. Huxman. This repeals a law previously passed by the State Legislature requiring the listing of soil when ordered by the State Supreme Court on the ground that it violates statutes against trespassing and invasion and was not uniform in application. The secretary of the State Board of Agriculture is charged with the enforcement of the new act, but authority to order the planting of trees, shrubs, or grasses is vested in the several boards of county commissioners, who may issue warrants in payment for the work."

[B., T. R.]

(2809)

WASHINGTON NOTES; THE NEW SOIL CONSERVATION LAW TACKLES THE DUST BOWL. New Repub. 91: 128. June 9, 1937.

"During the last few months, six Great Plains states have passed the standard soil-conservation-district law recommended by the Department of Agriculture. There are great hopes that the remaining Great Plains States will enact it before another year is out." The benefits to be gained under the law are reviewed.

BENNETT, H. H.

(2810)

TEXAS LEGISLATES FOR SOIL CONSERVATION. Jour. Amer. Soc. Agron. 23: 581-583. July 1931.

Soil erosion is recognized as the greatest menace to the agricultural lands of Texas, as indicated by a bill passed in April 1931, which authorizes the use of county and State road machinery for construction of terraces on privately owned lands. Three resolutions relating to soil conservation are quoted in full.

BLACKMER, F. M.

(2811)

WEST, WATER AND THE GRAZING LAWS. Survey Graphic 26: 387. July 1937.

Briefly discusses the Taylor Grazing Act and what it means to the rancher, large or small. The author seems inclined to believe that the act will increase erosion on the public domain.

- BUCKMAN, T. E. (2812)
THE TAYLOR GRAZING ACT IN NEVADA. Nev. Agr. Col. Ext. Bull. 76, 75 pp. 1935.

The purpose and history of the Taylor Grazing Act is set forth (H. R. 6462). "Its title and first section very clearly and frankly express the purpose and objects of the act to be: (1) 'To stop injury to the public grazing lands by preventing overgrazing and soil deterioration.'" The author discusses Nevada grazing districts, public lands statistics, leases, maps, and other subjects relating to the act.

- BUNN, CHARLES. (2813)
THE A. A. A. DECISION AND THE SOIL CONSERVATION ACT. Jour. Land and Pub. Utility Econ. 12: 199-200. May 1936.

The author discusses the constitutionality of sections 7 and 8 of the Soil Conservation Act approved February 29, 1936.

- CASE, W. W. (2814)
THE SOIL CONSERVATION ACT. A NEW MEASURE OF FARM AND NON-FARM PARITY. Annalist 47: 366-367, 392. March 6, 1936.

Explains the purposes of the Soil Conservation and Domestic Allotment Act, to be effected through grants of funds to individual States in return for adoption of suitable programs, these funds to be used for expansion of markets and protection of the interests of tenants and sharecroppers. Explains, also, the new parity index and discusses the new index as a basis for the national agricultural policy.

- CEYLON CENTRAL BOARD OF AGRICULTURE. (2815)
REPORT OF THE PROCEEDINGS OF THE EIGHTH MEETING OF THE CENTRAL BOARD OF AGRICULTURE. Trop. Agr. [Ceylon] 87: 307-327. November 1936.

This meeting was held at Peradeniya, Ceylon, September 24, 1936. A discussion on soil erosion was concerned with the further consideration of a resolution recommending that legislation be introduced to stop the practice of using scrapers on estates. Many of those present spoke in favor of the resolution, and others opposed it. It was urged that it would require the services of a whole-time officer to go into the subject of soil erosion, particularly cover crops.

- CHAPMAN, H. H. (2816)
SHALL THE DEPARTMENT OF THE INTERIOR BECOME THE DEPARTMENT OF CONSERVATION AND WORKS? Science 82: 101-102. August 2, 1935.

"This article is not a discussion of the reasons why such legislation should not pass . . . They hinge on two points. First, the organic resources, soil, forests and wild life, constitute a balanced whole, which can be regulated intelligently only by unified control in the hands of men trained in the fundamentals of biology and administration of such problems. Second, the continuous and continuing record of the Department of the Interior is such as to prevent those who understand these problems from extending their confidence to this department as the custodian of such resources."

- COLLIER, JOHN. (2817)
IN THE DEPREDATION AREA OF NORTHWESTERN NEW MEXICO. Indians at work 3: 1-8. June 15, 1936.

This article discusses existing wretched conditions among Navajo Indians because of the blocking of the Navajo boundary bill in the United States Senate. "Until the bill is passed, the operations of the Soil Conservation Service, the Indian Emergency Conservation Work, and generally, the rehabilitation grants of the Federal Government must go around this area of several million acres and may not enter it. This means that water development, soil saving, and the sundry operations necessary to prevent the complete wreckage of this watershed, await the passage of the Boundary Bill."

- CULLINGS, E. S. (2818)
LOCAL FLOOD CONTROL. Engin. News-Rec. 116: 915-917. June 25, 1936.

"New York River Regulating District Act points to the way in which flood control and river regulation can be directed by local bodies with the cost

of the work apportioned among the beneficiaries." Suggestions are included for amendments to attain a broader power in construction for local watershed improvements.

DAVIES, R. D. (2819)

STATE SOIL SAVING LAW PROPOSED. *Dak. Zephyr* 3: 2. January 1937.

FERNOW, B. E. (2820)

REASONS FOR THE ESTABLISHMENT OF FOREST RESERVATIONS. *Forester* 3: 67-68. May 1897.

"The laws enacted in 1878 appear to make legal a systematic plundering of this [Government timber] property. Not only has this baneful legislation led to destruction of millions of dollars worth of forest growth, but it has prevented any reasonable administration of the public timber domain . . . Reservation is the first step; regulation of the use of the timber the second; perpetuation of a valuable resource for coming generations the object."

GILCHRIST, FRED C. (2821)

[THE CONSTITUTION AND SOIL CONSERVATION.] *Cong. Rec.* v. 80: 2482-2485. February 20, 1936.

During the discussion on the Agricultural Adjustment Act, reference was made to various recent decisions of the Supreme Court including that on the original A. A. A. "The present bill does not invade the reserved rights of the States in any way, but, on the contrary, it proposes to vote appropriations to the States themselves so that they themselves may put into force a soil-conservation program, and do the other enumerated things set forth as the policy of the bill . . . This bill is founded for one thing upon soil conservation and in preventing soil erosion . . . Erosion precedes destruction and soil robbing results in ruin . . . Under this bill a new era will come to soil culture . . ." Mistaken and foolish policies in the control of agriculture are cited. A table showing certain payments under the A. A. A. is included.

GLICK, P. M. (2822)

STATE LEGISLATION FOR EROSION CONTROL. *U. S. Resettlement Admin. Land Policy Cir.*, pp. 19-24. July 1937. [Mimeographed.]

Presents reasons for formulating the standard State soil conservation districts law, what it provides, how districts are organized, how regulations are enforced and recent action of State legislatures in adopting legislation along the lines of the standard law.

HARROWER, D. C. (2823)

INCREASING FARMERS' INCOME. BUSINESS NOT ALTRUISTIC IN DEMANDING THIS. NEW AGRICULTURAL LAW CALLS FOR CONSERVATION OF SOIL. ESSENTIAL TO MAINTENANCE OF HIGH LIVING STANDARDS. *Barron's* 6: 19. April 20, 1936.

"The new farm law is a highly constructive piece of legislation on which can be built a permanent agricultural policy to the benefit of the whole country." With this statement the author proceeds to show that conservation and soil upbuilding are "vital facts to which farm income and the supplying of consumers' needs must depend." Prosperous agriculture rests on the fertility of the soil, its maintenance, and upbuilding.

HOCKLEY, H. A., COMPILER. (2824)

STATE LEGISLATION AFFECTING LAND USE ENACTED SINCE JAN. 1, 1936. *U. S. Resettlement Admin. Land Policy Cir.* pp. 14-22. June 1936.

Contains a list of State legislatures which had already met, and those in special or regular session at the time (June 15, 1936), with a brief digest of important bills dealing with land and land use which had been enacted into law between January 1 and June 15, 1936.

HURLBURT, V. L. (2825)

THE TAYLOR GRAZING ACT. *Jour. Land & Pub. Utility Econ.* 11: 203-206. May 1935.

Discusses the historical and economic background of the act, showing the need for this legislation, the objectives, the significance, and attitude of the public toward the act.

JOHNSON, LUTHER A. (2826)

[SOIL CONSERVATION.] Cong. Rec. v. 90: 2571-2572. February 21, 1936.

States that the soil conservation bill materially contributes to the conservation of the soil and aids the farmers of America. Its immediate passage is urged.

KANSAS LEGISLATIVE COUNCIL, RESEARCH DEPARTMENT. (2827)

SOIL DRIFTING PRELIMINARY REPORT SUBMITTING THE TEXTS AND SOME ANALYSIS OF THREE PROPOSALS FOR REMEDIAL LEGISLATION. Kans. Leg. Council Research Dept. Pub. 43, 12 pp., 1936. [Mimeographed.]

Discusses the Kansas soil drifting law of 1935, its unconstitutionality, excerpts from the opinion of the court, and possible legislation embracing a Kansas wind-erosion law and a soil conservation district law.

LEWIS, ELMER A., COMPILER. (2828)

LAWS RELATING TO FORESTRY, GAME CONSERVATION, FLOOD CONTROL, AND RELATED SUBJECTS. 132 pp. Washington, Govt. Print. Off. 1936.

A compilation of the following acts: Watershed Act and amendments; Reforestation act and amendments; Mississippi River Wildlife and Fish Refuge; Migratory Bird Conservation Act; Game Refuges; Extending Reforestation Act to Puerto Rico and Territories; Forest Service to Simplify Work and Promote Reforestation; Forest Products Laboratory, Madison, Wis.; Tree Planting on National Forests; Shade Trees to Plant Along Federal Highways; Eradication of Predatory and Wild Animals; Forest Land Management; Migratory Bird Hunting Stamp Act; Tennessee Valley Authority (Muscle Shoals); Mississippi River Flood Control and amendments; Beach Erosion Act; and Rural Electrification.

LORD, BERT. (2829)

CONSERVATION OF AGRICULTURAL LAND RESOURCES. Cong. Rec. v. 80: 2587-2588. February 21, 1936.

The processing tax is discussed. "This tax fell on all of our people, but it was hardest for the farmers, dairymen, and poor people, who had to pay the advanced cost of living . . . The substitute A. A. A. bill . . . proposes to subsidize the western and southern farmers by taking land out of production and putting it into alfalfa and other grasses which will be fed to dairy cows and cattle . . ."

MCNEAL, T. A. (2830)

THE NEW KANSAS SOIL DRIFTING LAW. PASSING COMMENT. Kans. Farmer 74: 4. February 27, 1937.

House bill 130 known as the "soil drifting law" which passed both houses of the Kansas Legislature is reviewed.

STATE SUPREME COURT KNOCKS OUT COMPULSORY SOIL LISTING LAW. Kans. Farmer 74: 6. June 6, 1936. (2831)

States that the Kansas Supreme Court has declared the compulsory soil-listing law unconstitutional. The author explains the law, and the court decision and says that other laws may be unconstitutional for similar reasons.

NELSON, LOWRY. (2832)

UTAH'S NEW SOIL CONSERVATION DISTRICT LAW. Utah Farmer 57: 7. April 10, 1937.

This law was passed by the 1937 legislature. "The real purpose back of this law is to bring into existence on a wide scale methods of control to reduce or prevent the erosion of the soil . . . it was considered wise to bring into direct action the forces latent in the state by the passage of a soil conservation districts law which would make it possible for the landowners themselves, to set up their own organization under the law." The general structure of the legislation is summarized.

NELSON, WILLIAM L. (2833)

[SOIL SAVING AND C. C. C. CAMPS.] Cong. Rec. v. 80: 2501-2502. February 20, 1936.

"If I had my way . . . instead of reducing the number of camps and the number of young men in these camps I would build them up to full 600,000

and carry on this work of saving soil and saving boys." Describes the work of the C. C. C. program and its results.

O'NEAL, E. A. (2834)

BUILDING BETTER FARMS. *Nation's Agr.* 11:7, 21. March 1936.

Discusses the Soil Conservation Act of 1935 and the great benefits the individual farmer and the Nation as a whole will derive from it.

PACK, A. N. (2835)

THE PUBLIC DOMAIN—UNCLE SAM'S STEP-CHILD. *Forestry News Digest*, pp. 16-17. February 1936.

The writer discusses the Taylor Grazing Act and suggests the centralization in one Federal department of the power to regulate grazing on Federal lands.

PAN AMERICAN UNION. (2836)

OBLIGATORY REFORESTATION IN CUBA. *Pan Amer. Union Bull.* 70:521-522. 1936.

Describes provisions of the Cuban reforestation law passed March 21, 1936, with regard to location of prospective plantings, nurseries, and hatcheries, conservation and propagation of rare trees, animal and bird refuge, forest laboratory, and cutting prohibitions. "For a period of 15 years no wood may be cut in virgin forests on Cuban mountains without permission from the Secretary of Agriculture . . ."

PETERSON, O. C., AND NORBERG, E. C. (2837)

A SUMMARY OF EXISTING RURAL LAND USE LEGISLATION IN MINNESOTA. U. S. Resettlement Admin. Land-use Planning Pub. 13, 108 pp. 1937. [Mimeographed.]

"This study is a summary of existing legislation in Minnesota relating to land use. It attempts to bring related statutes together in an orderly fashion and present them in such a way that they can be read by laymen." Laws governing flood control are cited, page 70. Forest conservation is treated in section 4, pages 38-57.

PRATT, J. H. (2838)

TWELVE YEARS OF PREPARATION FOR THE PASSAGE OF THE WEEKS LAW. *Jour. Forestry* 34:1028-1032. December 1936.

An address given at the silver jubilee in observance of the passage of the Weeks law held at Bretton Woods, N. H., September 13-15, 1936. This law provides for the protection of streams for navigation and water power.

REED, F. (2839)

THE QUESTION OF CONSERVATION JURISDICTION TO DATE. *Jour. Forestry* 34:724-725. July 1936.

The Lewis bill (S. 2665) designed to change the name of the Department of the Interior to The Department of Conservation and Works is discussed.

RIDDEL, GLENN. (2840)

ARKANSAS FIGHTS SOIL EROSION. *Ark. Farmer* 39:6-7, illus. June 1937.

Includes mention of provisions of the Arkansas soil conservation districts law, Act No. 167, recently passed by the Arkansas Legislature.

RINGLAND, ARTHUR C. (2841)

WATERSHED CONTROL IN ITALY. *Soil Conserv.* 2: 251, 265-266, illus. May 1937.

The law of integral land reclamation adopted in 1933 and better known as "Bonifica Integrale" is discussed. This law has for its objective the stabilization and betterment of rural life in all its aspects.

ROBERTS, C. (2842)

IT MUST NOT PASS. *Farmer-Stockman* 49: 8. June 1, 1936.

"The initiative petition which seeks to take the soil conservation program out of the hands of the extension division and put it under a political board of three men is on its way to the voters of Oklahoma . . . This brazen attempt to seduce the soil conservation program of the State should be met with such an avalanche of votes that never again will it be attempted."

[ROOSEVELT, FRANKLIN D.]

(2843)

EXECUTIVE ORDER AUTHORIZING THE ACQUISITION OF LAND NEAR PETERSBURG, VIRGINIA, FOR EMERGENCY CONSERVATION WORK. Fed. Register 1: 102. April 1, 1936.

The order was signed March 30, 1936. "The acquisition by the United States of such privately owned lands will permit work and improvements thereon that will provide for the said public lands disease control and protection from fires and soil erosion, and will aid in the restoration of the country's depleted natural resources . . ."

SHEPARD, W.

(2844)

INTEGRAL LAND RECONSTRUCTION. Jour. Forestry 33: 561-563. June 1935.

The bill creating a permanent Soil Erosion Service and the advantages resulting therefrom are treated. Examples of variable technique which will fit individual physical, economic, and human situations in erosion control are discussed.

(2845)

PUBLIC CONTROL OF DESTRUCTIVE LAND USE. Amer. Forests 41: 73. February 1935.

The author contends that article X of the Lumber Code is an important first step in an inevitable change in the whole land policy; the exercise of public control over uses of land that destroys natural resources, impairs public works, weakens the national power of defense, injures the general welfare, and creates destitution and unemployment that drain the public treasury.

SMITH, G. E. P.

(2846)

GROUNDWATER LAW IN ARIZONA AND NEIGHBORING STATES. Ariz. Agr. Expt. Sta. Tech. Bull. 65, 91 pp., illus. 1936.

"The present bulletin discusses the principles of groundwater law and the existing law in this and neighboring states. The bulletin lays the foundation for widespread discussion and, perhaps, further legislation. The author has not made dogmatic and arbitrary recommendations but has suggested the possible lines of procedure for consideration by the many and varied interests involved." Legislation with regard to use of water in Arizona and subsequent court decisions in Arizona are presented.

TOOTELL, R. B.

(2847)

GRAZING DISTRICTS; THEIR NATURE AND POSSIBILITIES IN RANGE LAND UTILIZATION. Mont. Agr. Col. Ext. Bull. 127, 22 pp. 1932.

"This publication has as its objective the following: 1. To acquaint the people of Montana with the idea of grazing districts. 2. To acquaint the people of Montana with similar types of organization for the use of grazing land. 3. To indicate the success which has been achieved to date with such organizations. 4. To show how these organizations can be used to advantage in better utilizing Montana lands, and finally—5. To give the details of organization for existing districts which will enable people in other localities to proceed in setting up similar organizations." Several pages are devoted to questions and answers on the subject.

UNITED STATES CONGRESS.

(2848)

AN ACT TO PROMOTE THE CONSERVATION AND PROFITABLE USE OF AGRICULTURAL LAND RESOURCES BY TEMPORARY FEDERAL AID TO FARMERS AND BY PROVIDING FOR A PERMANENT POLICY OF FEDERAL AID TO STATES FOR SUCH PURPOSES. 74th Cong., 2d sess. Pub. 461 [S. 3780] 5 pp. 1936.

Act approved February 29, 1936.

UNITED STATES CONGRESS.

(2849)

AN ACT TO PROVIDE FOR THE PROTECTION OF LAND RESOURCES AGAINST SOIL EROSION, AND FOR OTHER PURPOSES. 74th Cong., 2d sess. Pub. 46 [H. R. 7054], 2 pp. 1935.

Act approved April 27, 1935.

UNITED STATES CONGRESS, HOUSE COMMITTEE ON APPROPRIATIONS.

(2850)

HEARINGS . . . ON AGRICULTURAL DEPARTMENT APPROPRIATION BILL FOR 1937. 74th Cong., 2d sess. 1340 pp. 1936.

On January 28 estimates for the Soil Conservation Service appropriation were under consideration. Statements made by H. H. Bennett, W. C. Lowder-

milk, Henry D. Abbot, C. W. Collier, J. G. Lindley, and W. A. Jump are included.

(2851)

HEARINGS . . . ON AGRICULTURAL DEPARTMENT APPROPRIATION BILL FOR 1933. 75th Cong., 1st sess. 1,817 pp. Washington, D. C., 1937.

Testimony on soil conservation by representatives of the Soil Conservation Service is given, pages 1027-1176.

(2852)

SOIL EROSION NURSERIES. Hearings . . . on Agricultural Department Appropriation Bill for 1936. 74th Cong., 1st sess., pp. 22-23. January 21, 1935.

In the estimate for research activities the principal item is \$483,198 for soil erosion nurseries. This item was merely a continuation of an item given to the Department of Agriculture in public works the preceding year to set up this work. This is a continuation of it to provide the trees, grass, shrubs, etc., to be used by the various agencies of the Government that are engaged in soil-erosion work.

(2853)

STATEMENT OF H. H. BENNETT AS TO THE EXTENT AND EFFECT OF EROSION FROM THE NATIONAL STANDPOINT. Hearings . . . on Agricultural Department Appropriation Bill for 1930, 70th Cong., 2d sess., pp. 310-330. November 21, 1928.

There are fully 18 important regions which are very susceptible to erosion throughout the United States. Information is given as to the rapidity of soil erosion and its effects, and the experiments and demonstrations conducted at Spur, Tex., are described. "It is the first comprehensive soil erosion station in the history of the world and the work done there is doing great good."

UNITED STATES CONGRESS, SENATE COMMITTEE ON AGRICULTURE AND FORESTRY. (2854)

AN ACT FOR THE CONSERVATION OF RAINFALL IN THE UNITED STATES. 70th Cong., 1st sess. [S. 3484], pp. 21-27. May 3, 1928.

"Be it enacted by the Senate and House of Representatives . . . That in order to develop effective methods for the control of rainfall, for the prevention of erosion of farm, pasture, and woodlands, and for the conservation of the soil fertility of fields, pastures, and watersheds; to minimize the deposition of silt in reservoirs and the overwash of inert sands and gravels upon farm lands; to reduce the discharge of water and silt into streams from fields, pastures, and watersheds; and, in general, to aid in developing the best means of controlling, conserving, and utilizing the rain water that falls upon the land, the Secretary of Agriculture be, and he is hereby, authorized and directed to make such studies and investigations as he may deem necessary to carry out these purposes."

Statements made by H. H. Bennett, B. Youngblood, S. H. McCrory, W. R. Chapline, H. G. Knight, and A. G. McCall are included.

UNITED STATES CONGRESS, SENATE COMMITTEE ON APPROPRIATIONS. (2855)

STATEMENT OF H. H. BENNETT . . . ON H. R. 11418. 74th Cong., 2d sess., pp. 373-407.

"We are . . . asking for the restoration of certain cuts that were made in the House in connection with our program, which cuts we think would militate against the conduct of our work in a properly balanced way," Mr. Bennett states. "The reductions contained in the House bill will necessitate a serious curtailment of the present work of the Soil Conservation Service in addition to prohibiting the inauguration of almost all new work. This means that experiment stations on which construction is being started this year will remain uncompleted . . . Looking to the future, and planning for the future, if Congress so desires, for several years we could probably use in the neighbourhood of an additional half a million dollars for conservation survey work, and \$1,000,000 for the air pictures essential to this work . . ."

UNITED STATES CONGRESS, SENATE SUBCOMMITTEE ON AGRICULTURE AND FORESTRY. (2856)

PROTECTION OF LAND RESOURCES AGAINST EROSION. Hearings . . . on S. 2149, S. 2418, and H. R. 7054. 74th Cong., 1st sess. 78 pp. Washington, Govt. Print. Off. 1935.

UNITED STATES DEPARTMENT OF AGRICULTURE, OFFICE OF THE SOLICITOR. (2857)

CHRONOLOGICAL LIST OF LAWS IN FORCE WHICH AUTHORIZE THE DEPARTMENT OF AGRICULTURE OR CERTAIN OF ITS AGENCIES TO ENGAGE IN FLOOD CONTROL WORK OR TYPES OF WORK WHICH MAY CONTRIBUTE TO FLOOD CONTROL. 10 pp. Washington, D. C. January 29, 1937. [Mimeographed.]

Prepared for the Flood Control Coordinating Committee. The Soil Conservation and Domestic Allotment Act is defined in part, pages 6-10.

UNITED STATES OFFICE OF EXPERIMENT STATIONS. (2858)

ESTABLISHMENT OF THE SOIL CONSERVATION SERVICE. U. S. Dept. Agr. Expt. Stas. Rec. 72: 737-738. June 1935.

The act to provide for protection of land resources against soil erosion (H. R. 7054, Public Law 46) by the Soil Conservation Service is discussed.

UNITED STATES RESETTLEMENT ADMINISTRATION. (2859)

LEGISLATIVE ACTIVITIES AFFECTING LAND USE. CONGRESSIONAL ACTIVITIES. U. S. Resettlement Admin. Land Policy Cir. 43 pp. January 1936.

The legislative activities of the second session of the seventy-fourth Congress with the list of bills by number, title, and by whom introduced are given, pages 31-43.

UNITED STATES SOIL CONSERVATION SERVICE. (2860)

SOIL CONSERVATION DISTRICTS FOR EROSION CONTROL. U. S. Dept. Agr. Misc. Pub. 293, 19 pp., illus. 1937.

"Early in 1936 the Department [Agriculture] reached the conclusion that while soil conservation demonstrations could point the way, the States must provide adequate legal means of spreading tested soil conservation practices to all land suffering from erosion, if the problem is to be solved. The purpose of this publication is to discuss how the Department of Agriculture, as an arm of society, may cooperate with farmers through the mechanism provided by this State legislation."

(2861)

A STANDARD SOIL CONSERVATION DISTRICTS LAW. 64 pp. Washington, Govt. Print. Off. 1936.

This document was prepared at the suggestion of representatives of a number of States. "The standard act provides a procedure for the organization of soil conservation districts, such districts to be governmental subdivisions of the State and to exercise in the main two types of powers: (1) The power to establish and administer erosion-control demonstration projects and preventive measures; (2) the power to prescribe land-use regulations to provide for the prevention and control of erosion. Since the operation of such a program can be genuinely effective only if it meets with the wholehearted support of land operators, provision is made for referenda at important stages of the procedure. Thus, under the provisions of the standard act, no district can be organized or land-use regulations adopted unless at least a majority of the land operators to be affected have approved such organization or adoption in a referendum."—Foreword.

During 1937 the legislatures of 22 States passed laws providing for the creation of soil conservation districts somewhat similar to the State soil conservation districts law. These States are as follows: Arkansas, Act 197 approved March 3, 1937; Colorado, H. B. 258, approved May 6, 1937; Florida, S. B. 651, approved June 10, 1937; Georgia, H. B. 676, approved March 26, 1937; Illinois, H. B. 955, approved July 1937; Indiana, Enrolled Act 300, Senate, approved March 11, 1937; Kansas, H. B. 606, approved April 2, 1937; Maryland, H. B. 518, approved May 28, 1937; Michigan, Act 297, approved July 23, 1937; Minnesota, S. F. 1117, ch. 441, approved April 26, 1937; Nebraska, Leg. bill 553, approved May 18, 1937; Nevada, S. B. 126, approved March 30, 1937; New Mexico, S. B. 209, approved March 17, 1937; New Jersey, ch. 139, approved June 2, 1937; North Carolina, S. B. 343, approved March 22, 1937; North Dakota, S. B. 222, approved March 16, 1937; Oklahoma, S. B. 208, approved April 15, 1937; Pennsylvania, 557,

approved July 2, 1937; South Carolina, 182, approved April 17, 1937; South Dakota, H. B. 206, approved March 5, 1937; Utah, H. B. 164, approved June 8, 1937; Wisconsin, ch. 341, approved July 1, 1937.

- WALLACE, H. A. (2862)
WELFARE OF THE NATION AND THE NEW FARM ACT. U. S. Ext. Serv. Rev. 7:
50. April 1936.

The three major objectives of the new farm act are stated: (1) To conserve the soil and its fertility through wise land use; (2) to reestablish and maintain farm income at such levels as will permit national recovery to continue; (3) to protect consumers by assuring adequate supplies of food and fiber now and in the future. The author says "as to these objectives, the prospects are excellent of attaining the first and third, but in the realm of speculation as to the second." Conservation of soil is discussed. "In comparatively few years we have destroyed soil that nature has taken thousands of years to build. Soil erosion and soil depletion exact an annual toll running into the hundreds of millions, and more probably into the billions of dollars."

- WEHRWEIN, G. S. (2863)
WIND EROSION LEGISLATION IN TEXAS AND KANSAS. Jour Land and Pub.
Utility Econ. 12: 312-313. August 1936.

Comparison is made of the Texas Wind Erosion Act, passed May 21, 1935, with the soil drifting law passed in Kansas in 1913 which has never been enforced. The writer states that "perhaps the Texas law will be more workable since it follows the irrigation or drainage district principle. It provides means and machinery for financing erosion control instead of relying upon 'compulsions' to be enforced by an elected board of commissioners."

- WEIDELICH, A. C. (2864)
HOW EUROPEANS CONTROL MANAGEMENT OF WOODLANDS. Amer. Forests 42:
578. December 1936.

State laws of Württemberg, Germany, relating to cutting of timber are cited. The author says, "To most of us, such drastic restrictions are unheard of . . . Fifty years hence we will have to resort to those laws unless we change our methods voluntarily meanwhile."

- WILSON, M. L. (2865)
ANOTHER CHAPTER IN AGRICULTURE. Northwest School of Agr., Crookston,
Minn. 27 pp., February 4, 1936. [Mimeographed.]

The author discusses the dissolution of the Agricultural Adjustment Administration and the enactment of the Soil Conservation and Domestic Allotment Act. The problem of soil erosion is discussed, pp. 19-20.

- WING, DEWITT C. (2866)
N. S. F.! NATION IS OVERDRAWING IT'S SOIL BANK ACCOUNT. Prairie Farmer
108: 4, 30. April 25, 1936.

Brief discussion of soil impoverishment by overproduction, water, and wind erosion. Refers to laws passed by Congress in 1936 under which farmers will cooperate with the Federal Government to improve and conserve the soil.

PASTURE AND RANGE MANAGEMENT

- ANONYMOUS. (2867)
CONTOUR FURROWS IMPROVE PASTURE COUNTY AGENTS DECLARE. HOLD RAIN;
RESULT IN BETTER GROWTH OF GRASSES. Tobacco Grower 5: 3. November
1936.

"On those farms where farmers cooperating with the Soil Conservation Service have put in contour furrows, they report that these furrows hold back the rain and let it sink into the soil." Directions are given for the construction of such furrows.

- (2868)
GRAZING POLICY FOR TEN YEARS. Natl. Wool Grower 26: 6-7. March 1936.
Contains statement of Silcox regarding range policy and the various uses of forage as a national forest resource, and, the grazing policy as approved by Secretary Wallace.

ANONYMOUS.

(2869)

HARVESTS BUFFALO GRASS SEED. MACHINE MADE AT HAYS [KANS.] WILL HELP SOLVE PASTURE TROUBLE. Kans. Farmer 74: 6, illus. February 29, 1936.

The machine, built by L. C. Aicher and his associates, will be used by the Soil Conservation Service this year.

(2870)

OLD BOSSY GRAZES ON THE CONTOUR NOW. Farmer-Stockman, p. 18, illus. August 1, 1937.

On the 140,000 acres of pasture land treated by the Soil Conservation Service in the panhandles of Texas and Oklahoma, eastern New Mexico, southwest Kansas, and eastern Colorado, the grass is claimed to be much greener and thicker along contour rows. Tests show that moisture penetration increased more than 100 percent in some places.

(2871)

THE RANGE PROGRAM. Amer. Cattle Prod. 18: 10-11. October 1936.

Secretary Wallace approves of range-building practices and the rates of payment which stockmen may earn for them in the range-improvement program for 11 Western States. The program will apply to privately owned and privately controlled land; it is not a cattle or sheep reduction plan.

(2872)

SHALLOW FURROWS EFFECTIVE. Prairie Farmer 109: 29. April 10, 1937.

"Shallow furrows, cut by an ordinary plow furrowing the contours of sloping and hilly pastures at right angles to the slope, rank among the least expensive and most effective of erosion-control and water-conserving measures, according to Charles R. Enlow, chief agronomist of the Soil Conservation Service."

(2873)

SOIL CONSERVATION THROUGH EROSION CONTROL DEMONSTRATED TO RANCHERS. Calif. Citrogr. 22: 308, illus. May 1937.

This is largely a visual presentation of erosion-control demonstrations.

(2874)

WHERE DO WE GO FROM HERE? ECONOMICS CHIEF A. G. BLACK ANSWERS YOUR QUERY ABOUT EFFECT OF SOIL CONSERVATION PROGRAM ON HERD NUMBERS AND PRICES. Breeder's Gaz. 101: 4, illus. July 1936.

"The soil conservation program with its emphasis on the shifting of land from the production of soil-depleting crops to legume hay and pasture will tend to stimulate the keeping of more dairy cattle and dual-purpose cattle." This is the summary of an address made before the American Institute of Cooperation at the University of Illinois.

ABBOTT, J. B.

(2875)

FERTILIZING PASTURES—A SALES OPPORTUNITY. Fert. Rev. 11: 2-3, 14, illus. July-August 1936.

"I know of no crop the fertilization of which is attended with so great a certainty of immediate profit as pasture in feed-deficient regions." It is also stated that upwards of 1,000,000 tons of various kinds of fertilizers might well be used during the summer and fall in fertilizing pasture land by farmers who are cooperating in the soil conservation program. Adapted from an address given at the annual convention of the National Fertilizer Association, June 10, 1936.

ALDOUS, A. E.

(2876)

HOW CAN OUR DROUGHT-STRICKEN PASTURES BE RESTORED? Kans. State Bd. Agr. Rept. 54 (213): 37-45. 1935.

With respect to the effect of severe drought on permanent pastures, the author offers suggestions intended to cover the average conditions existing in each of the different types of pasture land in the State. Factors influencing drought injury, the improvement of drought-stricken pastures, temporary pasture crops, and pastures in western Kansas are considered.

- ALLRED, B. W. (2877)
 TWENTY YEARS OF PASTURE MANAGEMENT. Amer. Cattle Prod. 17: 6. May 1936.
 San Francisco Creek near Trinidad, Colo., was a gullied area where "labor and headwork" have effected a transformation. Once a desert ranch, it has become a highly efficient farming and pasture unit.
- ALTGELT, G. A. (2878)
 STOPPING EROSION WITH NATIVE GRASSES. South. Agr. 67: 42. February 1937.
 Disapproves of terraces in pasture lands. Author cites examples in Kentucky to emphasize his belief that sod is the main factor in erosion control and that terraces are not a factor in the reestablishment of the sod.
- AMERICAN BANKERS' ASSOCIATION. (2879)
 RESTORING DEPLETED RANGE WATERSHEDS. Amer. Bankers' Assoc. Agr. Comm. Bull. 10: 2-3, illus. September 1936.
 Natural revegetation, restoration measures by artificial reseeding and planting, and rehabilitation involving engineering works designed to prevent surface run-off and erosion are suggested as protective measures on range watersheds.
- AUSTIN, WAYNE. (2880)
 A DEVICE THAT FACILITATES SEEDING OF PASTURE TERRACES AND CONTOUR FURROWS. Soil Conserv. 2: 38, illus. August 1936.
 A flexible-winged, V-type harrow is shown in operation.
- AYLEN, DOUGLAS. (2881)
 A HOME MADE RIDGER. Rhodesia Agr. Jour. 32: 527-532, illus. August 1935.
 This article describes in detail the construction of a ridging implement for erosion control. Plans and specifications are given, and instructions for operation are included.
- BARNES, W. C. (2882)
 HERDS IN SAN SIMON VALLEY. WHAT HAS HAPPENED TO THE PROMISED LAND OF ARIZONA'S OLD TIME CATTLEMEN. Amer. Forests 42: 456-457, 481, illus. October 1936.
 The author compares conditions today with those in 1882 and 1895, and points to the San Simon Valley "as a shining example of what uncontrolled, unrestricted grazing will do to the best of ranges . . . The present emergency offers a vast field for true national conservation. The loss can be stopped, forage plants can be brought back, but only with time and proper methods of control and supervision."
- THE STORY OF THE RANGE. 60 pp., illus. Washington, Govt. Print. Off. 1926. (2883)
 Reprinted from part 6 of the hearings before a subcommittee of the Committee on Public Lands and Surveys, United States Senate, 69th Cong., 1st sess., pursuant to Senate Resolution 347, to investigate all matters pertaining to national forests and the public domain and their administration. An account of the occupation of the public domain ranges by the pioneer stockmen, the effect of unrestricted grazing on the forage and land, and the attempts that have been made to regulate grazing and perpetuate the natural forage resources of the open ranges.
- BELL, H. M. (2884)
 PASTURES AND SOIL CONSERVATION. BALANCED GRAZING AND MECHANICAL ASSISTANCE IN CONSERVATION PROVED VALUABLE BY TEXAS EXPERIMENT STATIONS. Southwest. Sheep and Goat Raiser 6 (16): 6-7, 23-24, illus., May 15, 1936.
 Contains notes on pasture listing experiments carried out at the Spur, Tex., experiment station. Results show increase in carrying capacity the second and third years after listing, with complete sod at end of second year.
- BENDER, C. B. (2885)
 FIVE YEARS' RESULTS ON PASTURE FERTILIZATION AND ROTATION MANAGEMENT. N. J. Agr. Expt. Sta. Bull. 564, 8 pp. 1934.
 "Rotation management of pastures insures the cattle getting much of the grass when it is 5 inches to 6 inches high. This grass then contains better than 16 per cent protein in the dry matter."

BENNETT, H. H.

(2886)

RELATION OF GRASS COVER TO EROSION CONTROL. Jour. Amer. Soc. Agron. 27: 173-179. March 1935. [Also in Agriculture and Livestock in India 6 (4): 527-533. 1936.]

This paper was presented as part of a symposium on the relation of pasture to the land-utilization program, before the annual meeting of the American Society of Agronomy, held in Washington, D. C., November 22, 1934.

BLACKBURN, DEAN W.

(2887)

USE OF LAND FOR FREE RANGE IN ARKANSAS. U. S. Resettlement Admin. Land Utilization Div. 11 pp., illus. Little Rock, Ark., 1936. [Mimeographed.]

The author suggests the formation of cooperative grazing districts as a "possible modification of the free range system which would preserve its main benefits to small farmers and eliminate its main evils," overgrazing and indiscriminate burning of forests. Arguments for and against the advantages of free range are considered. A map of areas open to free range in Arkansas in 1935 is included.

BOYLE, ROBT. V.

(2888)

OVERGRAZING—A REALITY. The Land, Today and Tomorrow 2: 15-17, illus. February 1935.

The author takes issue with those who do not take the overgrazing evil seriously.

BRAY, R. G.

(2889)

TOO MUCH DUST! Nation's Agr. 11: 2, 12-13, illus. May 1936.

The writer discusses devastation of grazing lands in the Southwest and recommends regrassing of such lands for permanent pasture.

BREWER, L. J.

(2890)

SOAK WIND-BLOWN SILT. RENEW SOD, CHECK EROSION WITH CONTOURS. Kans. Farmer 74: 7. January 16, 1937.

An experience of the Soil Conservation Service in furrowing a 30-acre pasture in Seward County, Kans., is cited. The amount of sod increased from an estimated 20 percent to 80 percent between spring and fall.

BRISEIN, JAS. S.

(2891)

THE BEEF BONANZA; OR. HOW TO GET RICH ON THE PLAINS. 222 pp., illus. Philadelphia, J. B. Lippincott & Co. 1881.

"There is an American Desert in the Far West which can never be used for any other purpose than the raising of great herds. It is of these lands and the cattle upon them the following pages treat. The plains of the West, instead of being barren and worthless as early geographers supposed, have become one of the richest parts of our public domain. The vast beef reservoir they contain is now the fit subject of an interesting volume." The book covers an era of prosperity in the livestock industry of the western plains.

BROWN, E. MARION, and COMFORT, JAS. E.

(2892)

MANAGEMENT OF BLUEGRASS PASTURES IN MISSOURI. Mo. Agr. Expt. Sta. Cir. 175, 4 pp., illus. 1934.

This circular is based upon the findings of a cooperative study conducted by the Department of Agriculture, the Missouri Agricultural Experiment Station, and local farms. Deals with time and regulation of grazing, supplementary pastures, the use of commercial fertilizers, and weed control.

BURCALOW, F. V.

(2893)

PASTURE IMPROVEMENT IN WISCONSIN. Save Our Soil 1: 3. April 1936.

This article discusses the relationship between good pasture management and erosion control.

BURLISON, W. L., RUSK, H. P., PIEPER, J. J.

(2894)

PASTURE IMPROVEMENT AND MANAGEMENT. Ill. Agr. Expt. Sta. Cir. 465, 50 pp., illus. 1936.

"Grasses and legumes to check erosion on sloping fields, legumes to enrich the soil, more and better pastures to supply forage for the several

millions of grazing animals on the farms of the state—are definite needs of Illinois agriculture." Eleven grasses and seven legumes adapted to Illinois conditions are described and their uses indicated.

BUTLER, OVID.

(2895)

WESTERN RANGES ARE PASSING. *Amer. Forests* 42: 254, 289-290. June 1936.

Secretary Wallace, in transmitting a report to Congress declares western grazing lands are becoming a great American desert and recommends the transfer of the Federal public domain from the Department of the Interior to the Department of Agriculture.

CARRIER, LYMAN.

(2896)

IMPROVEMENT OF PERMANENT PASTURES. U. S. Soil Conserv. Serv. SCS-TP-3, 5 pp. 1936. [Mimeographed.]

Discusses pasture improvement. The author maintains that too great emphasis has been placed on overgrazing as a cause of poor pasture and discusses the use of white clover and lespedeza. Four rules for pasture management are given.

(2897)

OVERGRAZING—A POPULAR FALLACY. *The Land, Today and Tomorrow* 1: 15-16. November 1934.

Data on pasture management and four rules for pasture improvement are listed.

CHAPLINE, W. R.

(2898)

CONTROLLING EROSION OF RANGE LAND THROUGH RANGE MANAGEMENT. 1st Internatl. Cong. Soil Sci. Washington, D. C., Proc. Com. 6 (4): 758-764. June 13-22, 1927.

"Over two-fifths of the land area of the United States is range land largely semi-arid or arid. This vast area forms the basis for the range livestock industry which plays a principal part in the prosperity of the West. Approximately 50 per cent of this area is not producing more than half of its potential yield of forage, and but little of it is in a high stage of productivity. Furthermore, the depletion of the natural scanty stand of vegetation has allowed an excessive erosion accompanied by serious depletion of the soil fertility. Measurements show this erosion to be far greater than is generally assumed. The maintenance of the forage stand depends upon checking this erosion; its improvement depends on restoring the fertility of the soil. Research has developed methods of range management which assure improvement in forage stand, improvement in soil conditions and a minimum of erosion. Before improved range management can be generally applied, it will be necessary for stockmen and the general public to acquire a much better appreciation of the importance of soil conservation on range lands."—Abstract, First Internatl. Cong. Soil Sci. Proc. Com. 6: 61. 1927.

(2899)

EROSION ON RANGE LAND. *Jour. Amer. Soc. Agron.* 21: 423-429. April 1929.

"Maintenance of adequate watershed protection on forest and range lands is vital to the continued prosperity of the West." The author maintains that among the numerous factors influencing erosion, the vegetative cover is the main single controllable factor. Erosion agencies and erosion losses are discussed, and the results of erosion-control studies by the Forest Service at the Great Basin experiment station in Utah are given.

(2900)

EROSION ON RANGES REDUCES PRODUCTIVITY AND WATER SUPPLY. *West. Cattle Markets and News* 2: 21-22. July 9, 1928.

Attributes erosion on ranges to overgrazing and forest fires, states that the re-establishment of vegetative cover is of the utmost importance as a control measure, and discusses the research work of the Great Basin station in the Southwest.

(2901)

WATERSHED PROTECTION ON CATTLE RANGES. *Producer* 9: 3-6, illus. Dec. 1927.

"Where dense forests prevail, the greatest degree of watershed protection is afforded; but in most parts of the West really dense forests are the

exception rather than the rule." The author shows how forestation and vegetative cover are important factors in erosion control and warns of the evils resulting from overgrazing.

- CHARLES, TUDOR. (2902)
A GOOD INCOME FROM RUN-DOWN GRASSLAND. *Kans. Farmer* 74: 3, 17, illus. August 15, 1936.

Sheep raising in Kansas as an aid to pasture rebuilding is recommended.

- CHILCOTT, J. S. (2903)
PRACTICE OF CONTOUR RIDGING. *Rhodesia Agr. Jour.* 26: 1129-1131. November 1929.

This article attempts to answer certain objections of farmers to contour ridging in Rhodesia. Itemized cost is given for the construction of a contour ridge 500 yards long, the cost being approximately £1.12s.

- CLARK, N. M. (2904)
HIGH PASTURES. *Country Gent.* 107: 7-8, 76-79, illus. March 1937.

The range country, vegetative cover, overgrazing and its effects, the four-goal program of range management, and erosion are among the points discussed.

- COMBS, J. F. (2905)
GROWING PASTURES IN THE SOUTH. 270 pp., illus. Chapel Hill, Univ. of N. C. Press. [1936.]

The author contends that pasture crops will aid in saving the millions of acres of topsoil now threatened by erosion. "This book is sent forth with the hope that it may be the means of creating a greater interest in the important program of pasture improvement, and that it may furnish reliable information on how to develop pasture areas into profitable grazing lands."

- COOPER, H. P. (2906)
GRASS FARMING IN THE SOUTH—FOR PROFIT AND FOR SOIL CONSERVATION, NECESSITATES THE EXTENSIVE USE OF LIME AND FERTILIZER. *Fert. Rev.* 11: 8-9. September-October 1936.

Since much of the land now used for pasture and hay crops is entirely too acid for the economical production of hay and pasture plants, it is necessary to apply sufficient lime to bring about a favorable soil reaction. Basic slag and phosphorus have proved valuable in pasture experiments in South Carolina.

- COVENTRY, B. O. (2907)
DENUDATION OF THE PUNJAB HILLS. *Indian Forest Rec.* 14, 31 pp. 1929.

Table of contents: The Forest Vegetation and Evidence of Denudation; Cause of Denudation; Effects of Denudation; Remedial Measures. "That the hills are steadily becoming denuded is the writer's own personal conviction, based largely on observations in connection with changes observed to be taking place in the vegetation; and in this note an attempt has been made to show that the cause of their denudation is solely the result of man's action by means of fire and grazing of his cattle, and that the obvious remedy appears to be the introduction of organized pasture management throughout the hills. The mere suggestion of a remedy may not be such a difficult matter, but to give practical effects to it is a more difficult and complex problem. Ignorance and apathy are factors difficult to contend with."

- COVILLE, F. V. (2908)
FOREST GROWTH AND SHEEP GRAZING. U. S. Dept. Agr., Div. Forestry Bull. 15, 54 pp. 1898.

Arguments are presented against further sheep grazing in the Cascade Range Forest Reserve. The writer suggests that proper restrictions and regulations be put into effect in order to prevent overstocking which is found detrimental to forest reproduction and soil conditions.

- (2909)
SHEEP GRAZING IN THE FOREST RESERVES. *Forester* 4: 30-32. February 1898.

The writer discusses the evils of overgrazing and the setting of forest fires to extend the range. He advocates a permit system for sheep grazing.

- DAHL, ARNOLD S. (2910)
 PROGRESS REPORT ON CONTOUR FURROWING IN THE CORN BELT. Soil Conserv. 2:
 141-142, 145, illus. January 1937.

The author also discusses equipment used in contour furrowing.

- DARLING, J. N. (2911)
 THE JOKERS IN WESTERN GRAZING. Successful Farming 34: 9, 22, 47, 49,
 illus. April 1936.

The author says that the granting of cheap grazing rentals on the Government domain and the free range do not help the general cause of agriculture, and that the next step in working out a farm program should be a great restriction, if not the total retirement, of such lands. The different kinds of Government grazing lands are outlined, and the Taylor Grazing Act is interpreted.

- DAVY, J. B. (2912)
 STOCK RANGES OF NORTHWESTERN CALIFORNIA. U. S. Bur. Plant Indus. Bull.
 12, 78 pp., illus. 1902.

This bulletin is the result of a thorough investigation of the grasses and forage plants of northwestern California to determine the adaptability of various species to different areas of the region. Plantings to check soil washing, wind erosion, and to control shifting sand dunes are dealt with, pages 44-63.

- DAYTON, W. A.
 IMPORTANT WESTERN BROWSE PLANTS. U. S. Dept. Agr. Misc. Pub. 101, 213
 pp., illus. 1931.

This study of shrubs and shrub planting in the West contains considerable data on plantings for the control of soil erosion.

- DODD, D. R., AND SALTER, R. M. (2914)
 BETTER PASTURES FOR OHIO LIVESTOCK. Ohio Agr. Col. Ext. Bull. 154, 32 pp.,
 illus. 1934.

Pasture problems and the procedure in providing continuous good pasture are considered. "Land areas without vegetative cover may lose, through soil erosion, 200 times as much soil as areas covered with a good bluegrass sod. Erosion control alone frequently justifies the cost of pasture improvement."

- DU TOIT, R. (2915)
 PROTECTING THE PASTURE AGAINST WIND-BLOWN SEA-SAND. Farming in So.
 Africa 9: 403-404, illus. October 1934.

"It is the duty of the farmer to combat this form of pasture destruction, and in order to do so several practical methods may be applied by him: (1) planting of trees; (2) erecting catchment fences; (3) bushing; (4) establishing sand-binding grasses." These four measures are discussed, and sand-binding grasses are listed.

- DUTTON, W. L. (2916)
 EROSION CONTROL PROVES SUCCESSFUL ON RANGES IN SOUTHEAST OREGON. U. S.
 Dept. Agr. Yearbook 1932: 187-189, illus. 1932.

The author attributes erosion in the Fremont Forest in southeastern Oregon to three causes: (1) Disappearance of beaver and beaver dams which in the past assisted in preventing gully washing during flood periods, (2) droughts which reduced the growth of soil-binding vegetation, and (3) rodent infestation. Legislative action for the protection of beaver, rodent extermination, range management, and intensive gully control are a few of the control methods considered.

- FICK, J. C. (2917)
 SUCCESSFUL COMBATING OF SOIL EROSION. Farming in So. Africa 6: 148, 158,
 illus. July 1931.

Describes how a certain farmer overcame the gradual destruction of a grazing area which was threatened by gullying.

- FORBES, R. H. (2918)
 THE OPEN RANGE AND THE IRRIGATION FARMER. Ariz. Agr. Expt. Sta. Bull.
 38, pp. 249-255. July 1901.

After alluding to the administrative difficulties of range improvement the writer states in conclusion: "That the hoped for outcome of range

study is: (1) the betterment of stock interests by demonstrating methods for reclaiming grazing lands; (2) the improvement of irrigation interests, by showing how measurable control may be exerted upon the run-off of a given range; and (3) by adding to the life of reservoirs in lessening the amounts of silt carried in flood waters."

FORSLING, C. L. (2919)

GRAZING CONTROL IS NEEDED FOR PROPER WATERSHED PROTECTION. U. S. Dept. Agr. Yearbook 1927:350-351. 1928.

The author recommends terracing and strip cropping in areas where overgrazing has been a factor in the encroachment of soil erosion and suggests the withdrawal of steep slopes from grazing as such areas are easily eroded and thus offset any small returns from grazing.

(2920)

SAVING LIVESTOCK FROM STARVATION ON SOUTHWESTERN RANGES. U. S. Dept. Agr. Farmers' Bull. 1428, 22 pp., illus. 1924.

"Cattle and sheep on Southwestern ranges are subject to severe losses from starvation during forage shortage caused by the ever-recurring droughts. To be prepared for these conditions by the establishment of range methods which anticipate them is essential . . . The practices herein recommended are based upon study and experience and should prove helpful to those engaged in livestock production in the Southwest . . ."

— AND DAYTON, W. H.

(2921)

ARTIFICIAL RESEEDING ON WESTERN MOUNTAIN RANGE-LANDS. U. S. Dept. Agr. Cir. 178, 48 pp., illus. 1931.

"The purpose of this circular is to bring together the best available information regarding the conditions under which artificial range reseeding may be justified, the species that will give best results, and the methods that may be employed with the greatest success . . . The information in this circular will assist in the selection of the sites to plant, the species to use, and the practices to follow, and will at least make it possible to conduct the trials in a more intelligent manner . . ."

FULLER, GUY C.

(2922)

DEVELOPING MACHINERY FOR HARVESTING BUFFALO GRASS. Soil Conserv. 1 (6): 8-10, 13-14, illus. January 1936.

"Buffalo grass has demonstrated its drought resistance and its ability to stage a comeback with the return of favorable conditions." The author explains how the vacuum principle is being employed in harvesting buffalo-grass seed.

FYVIE, T. L.

(2923)

PLANNED PADDOCKS BEAT EROSION AND OTHER EVILS. Farmer's Weekly 53: 1069-1071, illus. June 16, 1937.

Describes a shelterbelt and fencing lay-out that saves the soil, retains moisture, and helps both man and stock.

GERLAUGH, PAUL, AND KIRKWOOD, W. P.

(2924)

WILL MORE GRASS ACREAGE INCREASE LIVESTOCK? Successful Farming 34: 10-11, 29-31. June 1936.

Gerlaugh states that tests from Ohio show that an acre of grass produces less beef than an acre of corn, therefore livestock units may decrease through the influence of the conservation program. At the same time, Kirkwood states that figures from Minnesota show that increased fertility from use of legumes and planting in areas best suited to their production will demand more grain-consuming units.

GORRIE, R. M.

(2925)

THE FOOTHILLS GRAZING PROBLEM IN INDIA. Imp. Bur. Plant Genetics Herbage Rev. 5: 74-78, illus. June 1937.

"Processes of desiccation, deforestation and inevitable erosion can be seen by an intelligent observer on any train journey across India from north to south or east to west." Much of this is due to grazing conditions. Officers of the Punjab Government ". . . are now working in areas where erosion has already reached an alarming stage and their work in the villages has been towards a combination of rotational grazing closures,

and the reservation of hay-fields, with erosion control, torrent reclamation, stream training, and afforestation projects on a scale suitable to meet the needs of each village or group of villages."

- GRABER, L. F. (1926)
RENOVATING BLUE GRASS PASTURES. Wis Col. Agr. Ext. Cir. 277, 27 pp., illus. 1936.

"Dry weather, white grubs, inadequate nitrogen in the soil, and continuous close grazing have hurt permanent bluegrass pastures in southern and western Wisconsin. The renovation of such pastures consists in establishing dry weather legumes—sweet clover, alfalfa and red clover—in bluegrass sods without plowing . . . Bluegrass sod strengthened by fertility and grub-proofed with dry-weather legumes are effective means of erosion control."

- HAFENRICHTER, A. L. (1927)
LAND USE AND EROSION IN THE WEST. The Land, Today and Tomorrow 2: 5-8, illus. January 1935.

"When pioneer cattlemen reached the Palouse, the bunch-grass was stirrup-high. Today, little remains in many sections except miles of sand and rock and sage . . . The famed 'Johnson pasture' is an impressive relic of pioneer vegetation. This article is a tribute to the foresight of the original owner—and a warning to others."

- HALE, G. A. (1928)
PERMANENT PASTURES FOR EROSION CONTROL. South. Agr. 67: 29, illus. March 1937.

Recommends the use of Bermuda grass and discusses methods of cultivation. Clover and Dallis grass are also suggested.

- HALL, T. D., AND MURRAY, S. M. (1929)
THE BOTANICAL ANALYSIS OF INTENSIVELY GRAZED PASTURES. So. African Jour. Sci. 32: 189-196. November 1935.

Paper read before the South African Association for the Advancement of Science, July 2, 1935. "The results of a comparison of the percentage productivity method made on the same areas on intensively grazed pastures under various fertilizer treatments are recorded."—Summary.

- HANSON, H. C. (1930)
REVEGETATION OF WASTE RANGE LAND. Colo. Expt. Sta. Bull. 332, 9 pp., illus. 1928.

The writer explains conditions on waste areas and suggests remedial measures which should prove of value in various parts of Colorado. A deferred rotation system of grazing is among these measures.

- HEGNAUER, L. (1931)
GROWING AND MANAGEMENT OF PASTURES IN WESTERN WASHINGTON. Wash. State. Col. Ext. Bull. 155, 12 pp. 1930.

Among suggestions for pasture management are: Seed mixtures used in accordance with soil and moisture conditions; the application of liquid manures on grasslands; and rotational grazing. Combinations of grass for various types of land are discussed.

- HENDERSON, W. C. (1932)
RANGE CONSERVATION AND RODENT CONTROL. U. S. Biol. Survey. 10 pp. 1937. [Mimeographed.]

Shows how rodent control plays an important role in range conservation. "In many areas heavy infestations on sloping range lands have so undermined the soil with vast systems of burrows that serious soil erosion has resulted, for the water finds a rapid passageway when it reaches these gopher channels, and in a short time what was once a seemingly harmless system of gopher run-ways becomes a system of furrows and later, deep gullies."

- HENDRICKS, B. A. (1933)
VINE-MESQUITE FOR EROSION CONTROL ON SOUTHWESTERN RANGES. U. S. Dept. Agr. Leaflet 114, 8 pp. 1936.

"Vine-mesquite . . . may be regarded as one of the best native southwestern grasses for use in revegetating deteriorated range lands and in

controlling soil erosion. It forms a good protective ground cover in and along drainage depressions thus indicating its suitability for such use." Discusses the characteristics of the plant and gives suggestions on planting.

- HODGSON, R. E., GRUNDER, M. S., KNOTT, J. C., AND ELLINGTON, E. V. (2934)
A COMPARISON OF ROTATIONAL AND CONTINUOUS GRAZING OF PASTURES IN WESTERN WASHINGTON. Wash. State Col. Ext. Bull. 294, 36 pp., illus. 1934.

"This bulletin presents the results of experiments in which a direct comparison was made between rotational and continuous grazing of pastures where other principles generally employed in an intensive system of grass-land management were the same for both pastures . . ."

- HOLMES, C. L. (2935)
ECONOMIC ASPECTS OF PASTURE IN THE LAND PLANNING PROGRAM. Jour. Amer. Soc. Agron. 27: 180-194, illus. March 1935.

The author stresses two factors responsible for the need of more pastures in land-use planning—surplus crop production, and conservation of soils and other natural resources. Pasturing in the United States is contrasted with that in Europe.

- HOWARD, I. M. (2936)
ANCHORING RANCHES AND RANCHERS. Amer. Cattle Prod. 18: 3-4, illus. January 1937.

Emphasizes importance of holding soil by holding raindrops. "In retiring eroding cultivated land to grass and in storing up raindrops, the inhabitants of that country [Great Plains] are truly anchoring their lands and themselves."

- (2937)
LET THE PRAIRIES GO TO GRASS. Amer. Cattle Prod. 17: 3-5, illus. November 1935.

Grass must be restored if the cattle industry is to remain one of importance. Millions of acres have been lost through erosion. Contour ridges and native grasses check soil losses and conserve moisture.

- (2938)
MORE MOISTURE, MORE GRASS. Cattleman 23: 19, illus. February 1937. [Also in Amer. Cattle Prod. 19: 3-4, illus. June 1937.]

The contour ridges on a farm in Nowata County, Okla., are described and illustrated.

- HUNTER, BYRON, AND THOMPSON, HARRY. (2939)
THE UTILIZATION OF LOGGED-OFF LAND FOR PASTURE IN WESTERN OREGON AND WESTERN WASHINGTON. U. S. Dept. Agr. Farmers' Bull. 462, 20 pp., illus. 1911.

The primary object of this bulletin is to show how logged-off lands may profitably be used for pasture and how, under proper management, this use will materially reduce the cost of clearing the land and decrease the danger of forest fires. Several grasses and mixtures are recommended.

- HURST, F. J. (2940)
BUILDING BETTER PASTURES. Prog. Farmer (Miss. Valley Ed.) 51: 7, illus. October 1936.

The Mississippi Extension Service offers practical suggestions to farmers on how to build and renovate old pastures so that they will most effectively control erosion.

- JARDINE, J. T., AND ANDERSON, MARK. (2941)
RANGE MANAGEMENT ON THE NATIONAL FORESTS. U. S. Dept. Agr. Bull. 790, 98 pp., illus. 1919.

"The object of this publication is to aid in bringing about uniformity in range management and a better understanding of grazing use in relation to the other uses of the National Forests. The phases of range management which must be given proper attention are pointed out, and as far as practicable, rules of procedure are given." A section on watershed protection, pages 70-71, discusses the relation of the national forests to soil conservation.

JARDINE, J. T., AND HURTT, L. C.

(2942)

INCREASED CATTLE PRODUCTION ON SOUTHWESTERN RANGES. U. S. Dept. Agr. Bull. 588, 32 pp., illus. 1917.

"This bulletin presents the results of experiments which bear directly on the problem of how to produce more and better cattle on western range lands, a matter of pressing importance in view of the present need for increasing the Nation's food supply." The authors discuss the relation of soil erosion to overgrazing and recommend various control methods, pages 4-9.

— AND OTHERS.

(2943)

MANAGEMENT OF RANGE GRAZING LAND. Oreg. Agr. Col. Ext. Bull. 366, 16 pp. 1923.

The authors present available information, based upon experimental investigations and observations on the care and handling of ranges, for the benefit of range and grazing associations. Among the points discussed are the classes of stock to which the range is best suited, grazing periods, and management of cattle and sheep. Methods of deferred and rotation grazing are considered.

JONES, EARL.

(2944)

LIMING THE SOILS OF OHIO. Ohio Farmer 178: 8. August 1, 1936.

Soil liming in preparation for crops of clover and alfalfa is explained, and the author states that "our present soil conservation and erosion-control programs are based upon the fundamental principle of keeping a good cover on the land when it is in pasture or hay."

LANGLEY, B. C.

(2945)

LISTER REJUVENATES GRASS. Capper's Farmer 47: 18, illus. September 1936.

Results of studies at the Spur experiment station, Dickens County, Tex., to determine value of listing native grass pastures are briefly presented. "Results indicate the feasibility of close listing on the contour to rejuvenate native grass pastures. The conservation of water by this procedure largely accounts for the beneficial results obtained. The practices used are applicable to large areas west of the Mississippi which are subject to long summer droughts."

(2946)

REJUVENATING NATIVE GRASS PASTURES. Soil Conserv. 1: 1-2, illus. June 1936.

The author describes practices that "... are being employed in an effort to minimize the effect of insufficient rainfall on pasture lands by both State and Federal research agencies..." The plan of pasture treatment is applicable to a large portion of the territory west of the Mississippi River, especially to those regions that are visited almost yearly by prolonged periods of summer drought."

LINDLEY, J. G.

(2947)

PROTECTING COLORADO'S RANGE LANDS. Soil Conserv. 1: 12-13, illus. April 1936.

Survey of the problems and methods of the C. C. C. camps in Colorado. "An entirely gratifying result of the program is the reaction of the farmers."

LOGAN, C. A.

(2948)

PASTURE CONTOUR FURROWING MACHINE. Agr. Engin. 17: 111-113, illus. March 1936.

Results in contour furrowing, obtained with a new type of machine developed on the Limestone Creek demonstrational area of the Soil Conservation Service near Mankato, Kans., are described. The machine and its work are illustrated, and its advantages are given in a final summary.

LUSH, R. H.

(2949)

FUTURE PASTURES IN THE SOUTH. Fert. Rev. 11: 9, illus. September-October 1936.

"It is necessary to meet the plant food deficiencies of very poor soils by using fertilizer in the beginning of the pasture improvement and soil conservation programs."

- McCOLLAM, M. E. (2950)
 PERMANENT PASTURES. Wash. Agr. Expt. Sta. Bull. 211, 56 pp., illus. 1927.
 "It is hoped that, by presenting the results of observation on the present use of our pasture land as well as indications apparent from pasture experiments at this Station [Pullman, Wash.] this bulletin may arouse interest in the great possibilities in systematic care and management of permanent pasture land."
- McCoy, J. G. (2951)
 HISTORIC SKETCHES OF THE CATTLE TRADE OF THE WEST AND SOUTHWEST. 427 pp. Kansas City, Mo., Ramsey, Millett, and Hudson. 1874. [Reprinted, The Rare Book Shop, Washington, D. C. 1932.]
 "The aim and purpose of the author . . . is to convey in simple, unpretentious language, practical and correct information upon the opening, development, and present status of the Live Stock Trade of the great New West . . . with brief historic sketches of leading and characteristic men of the present day engaged in the business." Texas first attracted settlers from Mexico, as well as from the New World, and retains the ownership of her public domain. The ranges are described, and the whole story of great herds and great profits, the great fight between cattlemen and the railroads, the blizzard in 1871 which brought wholesale death to the cattle and to many men is told.
- MARATS, A. (2952)
 PERMANENT GRASS PASTURES VERSUS CROP FARMING. Farming in So. Africa 10: 71-72, 74. February 1935.
 Discusses soil erosion in the Indwe, Elliott, and Maclear districts in northeastern Cape Province, South Africa. Grasses recommended and described are kikuyu, rye, phalaris, rescue, cocksfoot, Rhodes, paspalum, fescue, and Yorkshire fog.
- MAYTON, E. L. (2953)
 PERMANENT PASTURE STUDIES ON UPLAND SOILS. Ala. Agr. Expt. Sta. Bull. 243, 26 pp., illus. 1935.
 Results of studies made to determine the possibilities of various grasses and legumes as pasture plants on typical upland soil are given. Dallis grass, carpet grass, hop clover, centipede grass, and lespedeza proved the most promising pasture plants for sandy upland soils.
- MERKLE, F. G. (2954)
 LIME AND FERTILIZERS IN SOIL CONSERVATION. Rural New Yorker 95: 666, illus. August 29, 1936.
 "The fertilizer experiments of the Pennsylvania Experiment Station at Snowshoe, Kylertown, and Bradford, as well as the numerous demonstration tracts conducted at various points in the State by the Extension Service prove that liming and fertilizing of pastures produce a thick sod in the course of a few years. Thick sods build up the soil and provide a ground cover that is practically erosion proof . . ."
- MILLER, A. E. (2955)
 SOME NEVADA RANGE GRASSES. Soil Conserv. Digest (Calif.-Nev.) 3: 3. December 1936.
 A number of grasses, including Indian rice grass, are listed.
- MONSON, O. W. (2956)
 WATER CONSERVATION IN EASTERN MONTANA. Mont. Farmer 23: 3, 27. July 1, 1936.
 Calls attention to the possibilities of improving the range lands of Montana by conserving floodwaters and reducing run-off losses. Suggests development of stock-water reservoirs, construction of small storage reservoirs, and diversion of floodwaters onto large grassy flats.
- MUIR, J. (2957)
 GRAZING. Forester 5: 31-32. 1899.
 "Not a single flock of sheep should be allowed on any of the dry mountain reservations." A part of the shrinkage of streams can be traced to sheep grazing. They destroy the undergrowth and produce aridity and desolation wherever they graze. "The forests cannot be preserved in a proper condition while sheep are allowed to range the reservation."

- MULLEN, C. W. (2958)
 CONTOURED PASTURES YIELD MORE GRASS. Farmer-Stockman 49: 5, 15, illus.
 April 1, 1936.

A description of contour farming in western Oklahoma and west Texas. The experiences of a group of farmers in Castro County, Tex., with terracing and experiments at the Spur station are presented.

- (2959)
 DRIVING IN THE RAIN. Farmer-Stockman 49: 3, illus. October 1, 1936.

Deplores neglect by Oklahoma farmers of the opportunity to conserve rainfall. Suggests contour furrows.

- NATIONAL LAND-USE PLANNING COMMITTEE. (2960)
 CONSERVATION OF THE GRAZING RESOURCES OF THE REMAINING PUBLIC DOMAIN.
 Natl. Land-Use Planning Com. Pub. 4, 21 pp. Washington, D. C. 1933.
 [Mimeographed.]

States that there are in the possession of the Federal Government approximately 176,000,000 acres of unreserved public land, and in addition about 60,000,000 acres that have been withdrawn from entry for various purposes. This valuable resource has been allowed to deteriorate. Proposes practices intended to protect and improve these lands by stabilizing the livestock industry, protecting watersheds, controlling erosion, and checking floods.

- NEEL, L. R. (2961)
 PROFITABLE PASTURE CARE. South. Agr. 66: 5, illus. September 1936.

Discusses pasture maintenance with reference to special type of grazing for Bermuda sod, bluegrass, orchard grass and redtop, and coarse grasses such as broomsedge. "Where the soil is enriched with phosphate, stable manure or a nitrogen fertilizer, as the deficiency in the soil demands, the bluegrass or other tame grass used will grow so vigorously that control of wild grasses, weeds and even bushes is made much easier."

- NELSON, E. W. (2962)
 INFLUENCE OF PRECIPITATION AND GRAZING UPON BLACK GRAMA GRASS RANGE.
 U. S. Dept. Agr. Tech. Bull. 409, 32 pp., illus. 1934.

This bulletin presents the results of a 13-year study (1915-27), on the influence of variable precipitation and several intensities of grazing on the black grama range type on the Jornada Experimental Range and adjacent public-domain range in southern New Mexico. "The adoption on southwestern ranges of such principles as this study has brought to light should make the range cattle business of the region much more stable and profitable."

- NEW HAMPSHIRE COLLEGE OF AGRICULTURE AND THE MECHANIC ARTS. (2963)
 BETTER HAY PRACTICES UNDER THE NEW HAMPSHIRE AGRICULTURAL CONSERVATION PROGRAM FOR 1937. N. H. State Agr. Col. Ext. Cir. 197, 4 pp. 1937.

Formulas for lime applications and top dressing legumes for pastures are presented.

- NICHOLS, F. B. (2964)
 WANTED! PERMANENT PASTURES. Successful Farming 34: 10, 82, 83, illus.
 April 1936.

Recommends a larger acreage of wheat and rye crops for pasture "... until the grasslands have had time to recover somewhat from their injuries." Also shows how burning of pastures stimulates an earlier growth in the spring. Deferred grazing is discussed.

- PARKINSON, D. (2965)
 RANGE LANDS AND THE BOULDER DAM. Amer. Forests 35: 618. October 1929.

The author shows how the renewal of vegetative cover on denuded ranges in Wyoming, Colorado, and Utah will decrease siltation in Boulder Dam.

- PARSONS, E. R. (2966)
 PASTURE FOR THE PLAINS. West. Farm Life 38: 18. April 15, 1936.

Discussion of the possibilities of wheatgrass, bluestem, oatgrass, alfalfa, sweetclover, Sudan grass, and rye for soil restoration in the overgrazed Plains region.

PEARSE, C. K., AND WOOLLEY, S. B.

(2967)

THE INFLUENCE OF RANGE PLANT COVER ON THE RATE OF ABSORPTION OF SURFACE WATER BY SOILS. *Jour. Forestry* 34: 844-847, illus. September 1936.

"The study reported, which is based upon measurements with inexpensive and portable equipment, reveals that range plants exert a marked influence on the rate water is absorbed by surface soils. Moreover, because plants which are most conducive to water absorption are also of greatest value for grazing purposes, the study clearly suggests that proper range management and adequate watershed protection go hand in hand."

PETERSON, W.

(2968)

KEEPING NATURE'S BALANCE ON THE WESTERN RANGE. *Amer. Forests* 39: 343-345, illus. August 1933.

"When normal erosion is disturbed the pendulum swings to destruction." The author discusses the erosion-control activities of the C. C. C. in the West. "The call of the Western range is for conservation. A definite program and adequate administration will bring it about."

PICKFORD, G. D.

(2969)

THE INFLUENCE OF CONTINUED HEAVY GRAZING AND OF PROMISCUOUS BURNING ON SPRING-FALL RANGES IN UTAH. *Ecology* 13: 159-171, illus. April 1932.

"The aim of the present study has been to determine the changes which have taken place in the character of the vegetation and the grazing capacity on the foothill area or the so-called spring-fall range type of Utah as the result of grazing, fire or other humanly induced factors, during the four score years that the region has been settled. This study is a part of a research project recently undertaken by the Intermountain Forest and Range Experiment Station of the Forest Service, to develop more suitable methods of range management for this important class of grazing land."

PIETERS, A. J.

(2970)

A DIGEST OF PASTURE RESEARCH LITERATURE IN THE CONTINENTAL UNITED STATES AND CANADA, 1885 TO 1935. U. S. Bur. Plant Industry, Div. Forage Crops and Diseases. 130 pp. 1936. [Mimeographed.]

POTTER, A. F.

(2971)

GRAZING AND WATER STORAGE IN THE BLACK MESA FOREST RESERVE. *Forestry and Irrig.* 8: 236-241, illus. June 1902.

"The crop of forage which grows upon this open range is one of the country's most valuable resources and can be harvested only by grazing." The manner of handling sheep and the present rules for grazing in forest reserves are discussed. "If the plans for the regulation of grazing prove to be practical and the forage crop is thus utilized without injury to the timber or water supply, the result will be an increased sentiment in favor of the forest reserves and a great benefit to the commonwealth."

PRETORIA UNIVERSITY, GRASSLAND RESEARCH COMMITTEE.

(2972)

PROGRESS REPORT ON SOIL EROSION AND GRASSLAND EXPERIMENTS. Pretoria Univ., Grassland Research Com. (not paged), illus. 1936. [Mimeographed.]

The following experiments are recorded: Run-off and erosion, percolation, evaporation, and evapotranspiration. Other experiments in grazing and pasture grasses, the fertilization and cultivation of natural veld, and the influence of time and duration of rest period on a veld sward are described.

RACHFORD, C. E.

(2973)

SOME PROBLEMS OF RANGE ADMINISTRATION ON NATIONAL FORESTS. *Amer. Cattle Prod.* 16: 18-19. February 1935.

During the past 7 years there has been extreme drought and a consequent serious deterioration in the forage crop. This entails stock reduction and cooperation in land use and planning. The problem of coordinating national, forest-grazing privileges with those of the public domain is considered, as well as the question concerning limits.

RAINE, W. MACLEOD, AND BARNES, W. C. (2974)

CATTLE. 340 pp. Garden City, N. Y., Doubleday, Doran & Co., Inc. 1930.

On page 304 a description is given of the ranges being devastated by cattle and of the institution of forest reserves in the West. The controversy between Government and cattlemen over the question of grazing is discussed. "As they began to get better acquainted with and to learn something of the plans of the forestry men for handling the wooded areas, the more level-headed of the stockmen realized that there was more in the idea of injury to the young timber and the watersheds by heavy grazing than they had previously cared to admit."

RAYMOND, L. C. (2975)

PASTURE STUDIES, VIII. IMPROVEMENT OF GRAZING LANDS IN EASTERN CANADA. Empire Jour. Expt. Agr. 4: 51-60, illus. January 1936.

"Space will permit only of a generalized discussion of the subject under review. Results of experimental work are still largely unpublished and therefore cannot be given. The phases dealt with most fully will include the natural features of the organization involved in pasture-improvement work, together with a statement of the important projects that are under way." Research work and organizations involved are described, and a list of the more important lines of work being pursued at the New Brunswick station is given.

REYNOLDS, R. V. R. (2976)

GRAZING AND FLOODS: A STUDY OF CONDITIONS IN THE MANTI NATIONAL FOREST, UTAH. U. S. Forest Serv. Bull. 91, 16 pp., illus. 1911.

The writer reviews the history of grazing, floods, damage from floods, efforts to prevent damage, conditions affecting floods, topography, and future regulation of grazing. "There can be no reasonable doubt that the torrents which have devastated this region within the last twenty years have been caused primarily by overgrazing, and that they can be largely controlled, if not entirely eliminated, by a restoration of the natural protective cover of shrubs and grasses."

RITER, W. E. (2977)

RODENTS ON RANGES AND PASTURES. Amer. Cattle Prod. 18: 8-9, illus. December 1936.

"Destruction and consumption of range forage resources by rodents not only rob domestic livestock and game of food that rightfully should be utilized by the latter animals, but such destruction further accelerates the process of denuding vast areas of plant cover and thus assists the forces of soil erosion in carrying on their devastating role."

SAMPSON, A. W. (2978)

FORAGE PRODUCTION AND SOIL PRESERVATION. West. Cattle Markets and News 3: 15, 41-42, illus. December 9, 1929.

Recommends and describes various grass plantings to establish a protective vegetative covering on western pasture lands.

(2979)

PLANT SUCCESSION IN RELATION TO RANGE MANAGEMENT. U. S. Dept. Agri. Bull. 791, 76 pp., illus. 1919.

"It is the object of this bulletin to point out what plants are reliable indicators of overgrazing in the various types and how they may be used as guides in revegetation and the maintenance of the forage crop . . ."

(2980)

RANGE AND PASTURE MANAGEMENT. 421 pp., illus. New York, John Wiley & Sons, Inc. 1923.

This book is divided into three parts: Part 1 is entitled "The Grazing Industry and Range Control;" part 2, "Pasture Revegetation and Forage Maintenance." Under chapter 9 of part 3, "Control of Erosion on Range and Pasture," there is a full discussion on the causes and kinds of erosion, its damage to the individual farm and the Nation, soil types, plant growth and revegetation, and various control measures.

SAMPSON, A. W.

(2981)

THE RESEEDING OF DEPLETED GRAZING LANDS TO CULTIVATED FORAGE PLANTS.
U. S. Dept. Agr. Bull. 4, 34 pp., illus. 1913.

The author gives the location of the reseeding projects in 11 States within the national forests and says that reseeding investigations show that returns secured fully warrant the expense. He recommends several species of grass and gives directions for sowing. A discussion is given on investigations in the Wallowa Mountains, embracing climatic considerations, descriptions of the plots, spring versus autumn seeding, relation of altitude to reseeding, etc. Estimates are given on relative amounts and costs for reseeding.

— AND WEYL, LEON H.

(2982)

RANGE PRESERVATION AND ITS RELATION TO EROSION CONTROL ON WESTERN GRAZING LANDS. U. S. Dept. Agr. Bull. 675, 35 pp., illus. 1918.

"The authors discuss rather fully the causes and effects of erosion on grazing lands in the West and recommend remedial and preventive measures based largely upon observations begun in 1912 on two representative areas subject to flooding on the high summer range of the Manti National Forest in central Utah. The results of these studies are deemed applicable to many mountain ranges in Utah, Wyoming, Idaho, Nevada, Arizona, and New Mexico, and to a less extent in other western states . . ."—Expt. Sta. Rec. 39: 439. 1918.

SEMPLER, A. T.

(2983)

FOLLOWING CONTOUR FURROWS ACROSS THE UNITED STATES. Soil Conserv. 2: 134-138, 145, illus. January 1937.

A review of contour furrowing as it is practiced in various regions of the United States. The author points out the low cost of contour-ridge construction and refutes many objections to contour furrows, proving them unfounded.

(2984)

PASTURES THAT ARE WELL MANAGED SERVE AS MEANS OF DROUGHT INSURANCE.
U. S. Dept. Agr. Yearbook 1935: 270-273. 1935.

Among other advantages of pasture management the author states: "There is still another great advantage in having reserve grazing for drought insurance. Where land has an appreciable slope and is subject to erosion, the greater the growth of grass the less erosion occurs. On overgrazed land, erosion may take place as fast or faster than on cultivated soil, because loose soil absorbs water more rapidly than bare, compact soil."

— AND ALLRED, B. W.

(2985)

RANGE IMPROVEMENT BY WATER SPREADING. Soil Conserv. 2: 269-270, 288, illus. June 1937.

Range improvement is illustrated by comparing land along the Frijole Creek with that along the San Francisco Creek, both in Colorado, and only a few miles apart. "Along Frijole Creek can be seen huge webs of gullies and gulches, cut by the erratic torrential rains . . . until the whole drainage is in the incipient badland stage." Along San Francisco Creek "trees grow along the streams, cattle fatten on the rich grasses, and dark green fields of alfalfa thrive on the lower better-watered lands."

— VINALL, H. N., ENLOW, C. R., and WOODWARD, T. E.

(2986)

A PASTURE HANDBOOK. U. S. Dept. Agr. Misc. Pub. 194, 89 pp., illus. 1934.

This publication contains two parts. Part 1, entitled "The Establishment, Maintenance, and Improvement of Pastures," by H. N. Vinall and C. R. Enlow, discusses the various kinds of pasture together with the type of pasture plants best suited to each kind in the various sections of the country. The discussion is confined chiefly to tame pastures, and is concerned almost entirely with cultivable lands; part 2, Utilization of Pastures, by A. T. Semple and T. E. Woodward, considers the following major features: Hohenheim system of pasture management; use of permanent pastures in winter; stock-poisoning plants; pastures for beef and dual-purpose cattle; pastures for horses and mules; pastures for dairy cattle; pastures for sheep and goats; pastures for swine; and pastures for poultry.

SHEAR, C. L. (2987)

CONSERVATION OF PUBLIC LANDS. *Science* 83: 204-205. February 28, 1936.

The author points out that enthusiasm for conservation is belated and in this connection presents an unpublished section of Bulletin 25 of the United States Department of Agriculture, 1901, entitled "Field Work of the Division of Agrostology." This unpublished section relates to Government control of grazing land and the serious consequence traceable to the present lack of land control. "It is not clear why the government should not derive some revenue from the use of its public lands and any such income might be advantageously expended in the building of reservoirs or other improvements which would facilitate the development of the country."

SKOTT, H. E. (2988)

THE CONSERVATION PROGRAM. *Hoard's Dairyman* 82: 84. February 10, 1937.

The author recounts his personal experience of operating a hilly farm in the upper Mississippi Valley entailing the use of limestone, phosphates, legumes, terraces, brush dams, tree plantings in gullies, and other soil-conserving practices. He points out that soil conservation will result in more legume hay and grass, more cattle, and consequently more dairy products.

SPILLMAN, W. J. (2989)

EXAMPLE OF MODEL FARMING. U. S. Dept. Agr. Farmers' Bull. 242, 16 pp., illus. 1906.

"The methods of management on a 15-acre farm that raises all the roughage for 30 head of stock, 17 of which are cows in milk, can not fail to be of interest to farmers in all parts of the country. The farm in question is situated in southeastern Pennsylvania." How the soil was improved, crops, and management are described.

STAPLETON, D. V. (2990)

PASTURE CONTOURING ACHIEVES MULTIPLE RESULTS. *Soil Conserv.* 1: 7-8, illus. August 1935.

"Contour furrowing in pastures—with which this article is particularly concerned—is proving its several values on the Okatibbee River (Miss.) project, where it is rapidly gaining headway as a farming practice."

STEPHENSON, J. B. (2991)

PASTURE IMPROVEMENT AND ROTATIONAL GRAZING. *Jour. Dept. Agr. So. Aust.* 37: 1008-1011. March 1934.

The author discusses a 5-year experience with grasses on areas of higher rainfall in Australia. Subterranean clover is emphasized, and instructions are given for its cultivation.

STRONG, HELEN M. (2992)

ON OPPOSITE SIDES OF AN OLD SOIL FENCE. *Soil Conserv.* 2: 277-281, 284, 286, illus. June 1937.

Shows the contrast between regulated and unregulated grazing. Specific examples in the States of Washington, Wyoming, and Utah are discussed.

SUTTON, M. J., SUTTON, M. H. F., AND PERCIVAL, J. (2993)

PERMANENT AND TEMPORARY PASTURES. Ed. 9, 202 pp., illus. London, Simpkin Marshall, Ltd. 1929.

"During recent years much attention has been paid to the possibilities of breeding improved strains of grasses and clovers, with the object of attaining increased productivity and higher feeding value in the herbage, and considerable success has already been achieved." The drainage of grassland, cultural preparations, the selection of grasses and clovers, the immediate after-management of new pastures, the management and improvement of old grassland, breaking up old grassland, and temporary pastures are all considered. Agricultural grasses, clovers, and other leguminous plants are listed and illustrated.

TALBOTT, M. W. (2994)

RANGE WATERING PLACES IN THE SOUTHWEST. U. S. Dept. Agr. Bull. 1358, 43 pp., illus. 1926.

"This bulletin presents the results of over three years' study and observation, under varying conditions, of more than 200 reservoirs, 50 wells, and numerous water developments of other types in Arizona and New Mexico. Although the methods and practices outlined may require modifica-

tion to meet local conditions, the conclusions will apply generally. The conservation of storm water in reservoirs, or 'tanks' as they are known in the Southwest, and the spacing of range watering places are emphasized as being of particular importance." The relation of the subject to soil conservation is brought out on page 5, "The cumulative effect on the range of overgrazing and drought is reflected in killed sod, reduced vitality of surviving plants, increased erosion, and, on certain forest ranges, in serious injury to timber reproduction."

THALMAN, R. R. (2995)

WHEN GRASS COMES BACK. Capper's Farmer 47: 12, illus. August 1936.

"A grass program for the farm looking toward soil conservation and a stabilized agriculture cannot succeed in the absence of a livestock program. The latter cannot succeed unless plans are so laid that the business can continue from year to year. A feed reserve is the answer to this problem. When accomplished, good feeding methods, efficient production, and good livestock management will result."

TOWER, HAROLD. (2996)

PASTURE MANAGEMENT AND EROSION CONTROL. The Land, Today and Tomorrow 1: 16-18. November 1934.

A study of the Plum Creek project in Nebraska showing that overgrazing not only reduces the amount of pasturage produced but also affects erosion.

UNITED STATES AGRICULTURAL ADJUSTMENT ADMINISTRATION. (2997)

CONSERVATION OF THE WESTERN RANGE. U. S. Agr. Adjustment Admin. WR-Leaflet 103, 11 pp., illus. Washington, Govt. Print. Off. April 1937.

Range conservation is mentioned as a special problem. "The range program for each State is adaptable to the requirements of each ranch as shown by facts determined through a field examination of the range land in the ranching unit concerned. The program is a cooperative project designed to secure specific results for the individual ranch." Range-building practices and rates of payment, water-conservation practices, the building of range fences, and natural reseeding by deferred grazing are all discussed.

UNITED STATES CONGRESS. (2998)

THE WESTERN RANGE—A GREAT BUT NEGLECTED NATURAL RESOURCE. U. S. Cong. 74th, 2d sess, S. Doc. 199, 619 pp. Washington, Govt. Print. Off. 1936.

A report on the range problem of the western part of the United States prepared by the Forest Service in response to Senate Resolution No. 289 (74th Cong., 2d sess.). Literature cited, pages 557-566. Subject-matter headings are: Southern Forest Ranges, pages 567-580; Alaska, pages 581-598; Range Types, page 599.

UNITED STATES DEPARTMENT OF AGRICULTURE. (2999)

TOO MUCH GRAZING STARTS SOIL WASHING AND MAY LEAD TO RUIN OF GOOD RANGES. U. S. Dept. Agr. Weekly News Letter 6: 9. October 9, 1918.

"Excessive grazing, which injures the vegetative cover, will frequently permit erosion to get a start on the range . . . Three or four seasons of excessively heavy grazing on a watershed will usually give the elements a chance to start their destructive work . . ." Prevention of erosion is better than curing it.

UNITED STATES EXTENSION SERVICE. (3000)

A WELL-PLANNED CONTEST SHOWS VALUE OF GREEN PASTURES FOR NEBRASKA. U. S. Ext. Serv. Rev. 7: 37, illus. March 1936.

The author describes the results of the Nebraska state-wide pasture-improvement contest of 1935. The results indicate that many farmers were able to withstand the 1934 drought by having much of their land seeded down to grass. Never before had there been so much interest shown in brome grass.

UNITED STATES SOIL CONSERVATION SERVICE. (3001)

AGRONOMY AND RANGE MANAGEMENT CONFERENCE, DENVER, COLO., JANUARY 1937. U. S. Soil Conserv. Serv. 98 pp. 1937. [Mimeographed.]

Papers presented at this conference were: The place of agronomy and range management in soil conservation, by C. R. Enlow; Relationships with other agencies, by D. S. Myer; The place of range management in soil and water conservation, by T. G. Taylor; Grazing control as a means of improv-

ing cover, by J. L. Lantow; Revegetation for soil and water conservation, J. H. Christ; The use of contour furrows and related structures on pasture and range land, by Fred C. Newport; Soil and water conservation in the production of cultivated crops, by Charles B. Ahlson; The importance of supplemental feed in western range conservation work, by A. T. Semple; Costs of conservation operation, by R. L. McGrath; and Range surveys, by W. T. White and L. E. Spence.

(3002)

FENCING MANUAL. 39 pp., illus. 1937. [Mimeographed.]

"The inclusion of fence building, or the supplying of materials for their construction in the cooperative, demonstrational program of the Soil Conservation Service is predicated on the fact that in developing acceptable soil husbandry and farm management practices on cooperating farms, some protective measures must be provided to protect or reduce injury to soil and vegetation that arises from the grazing and trampling of livestock. Thus fence building is entirely a protective measure and should always be considered as such." Complete designs, specifications, and construction data are given.

(3003)

WILD WHITE CLOVER. Soil Conserv. News 2 (2): 7. March 1936.

Recommends the planting of wild white clover in pastures.

VAN REENEN, R.

(3004)

REGULATED GRAZING AND EROSION. Farming in So. Africa 5: 544-547. February 1931.

A paper read before the Soil Erosion Council at Pretoria. Emphasizes the responsibility of the stock farmer with regard to regulated grazing as a soil-erosion preventive. The dangers of overstocking grazing land are stressed.

WELCH, J. S.

(3005)

THE MANAGEMENT OF IRRIGATED GRASS PASTURES. Idaho Agr. Expt. Sta. Bull. 95, 17 pp., illus. 1917.

This bulletin describes the results of studies in grass pasture management at the Gooding experiment substation in Idaho.

WHITE, J. H.

(3006)

COLORADO STOCKMEN MEET. GROWERS AND FEEDERS POSTPONE ACTION ON A. A. A. RANGE PROGRAM UNTIL LATER CONVENTION. West. Farm Life 38: 2. July 1, 1936.

Outlines the proceedings of the 69th annual convention of Colorado Stock Growers and Feeders, held at Fort Collins, Colo., June 11, 12, and 13. Quotes as follows from address of George E. Farrell, of A. A. A. "Let me emphasize that the purpose of a range program, if put into effect, will not be to reduce the number of livestock, but to improve grazing resources. In many cases the most practical methods will be to adjust the livestock load for grazing lands for several years. In other sections rotation grazing or resting grazing lands during certain months may prove practical."

WILKINS, F. S.

(3007)

EFFECT OF SPECIES OF GRASSES AND LEGUMES SOWN AND TREATMENT UPON THE POPULATION OF MEADOWS AND PASTURES. Iowa State Col. Jour. Sci. 9: 391-398. 1935.

"This study was made in order to determine the manner in which cultivated legumes and grasses respond to treatment under meadow and pasture conditions on two soil types on the Iowa Agricultural Experiment Station farms at Ames. Since Kentucky bluegrass—the dominant species in these studies—is also dominant in most pastures of Iowa, it is believed that the results here reported may be applicable to most parts of the State."

(3008)

EFFECTS OF OVERGRAZING ON KENTUCKY BLUEGRASS UNDER CONDITIONS OF EXTREME DROUGHT. Jour. Amer. Soc. Agron. 27: 159. February 1935.

Throughout a survey made in October 1934, in the severe drought area of southwestern Iowa, it was observed that pastures most closely grazed

suffered the most and showed the disastrous effect of overgrazing. A pasture 2 miles distant, of the same soil type and of similar topography, where the turf and cover of Kentucky bluegrass were excellent, has been moderately grazed in 1933 and 1934.

WILSON, B. (3009)
THE WASTE OF NATIONAL RESOURCES. Amer. Cattle Prod. 18: 3-7, 21, illus. April 1937.

Discusses overgrazing, forest denudation, and wind erosion in New Mexico. In reviewing control practices the writer says that the present soil conservation program is inadequate and proposes a new policy of range and pasture management.

WILSON, C. P., NEALE, P. E., PARKER, K. W., AND WATENPAUGH, H. N. (3010)
SOIL AND RAINFALL CONSERVATION IN NEW MEXICO. N. Mex. Agr. Expt. Sta. Bull. 238, 45 pp., illus. 1936.

"Range management and erosion control are so closely allied that one often implies the other . . . Perennial forage plants that would endure drouth, grazing and the depredations of rodents well and that would form a solid mass of vegetation on or very close to the ground would be the ideal sort."

WING, DEWITT C. (3011)
RANGE STOCK RAISING AND CONSERVATION. Natl. Wool Grower 27: 15-16. July 1937.

States that overgrazing in the Western States is causing serious soil losses by wind erosion. Control measures of the Soil Conservation and Domestic Allotment Act are discussed.

WOEHLKE, W. V. (3012)
THE BATTLE FOR GRASS. Sat. Evening Post 206: 10-11, 79-81, 84, illus. November 25, 1933.

A description of soil-erosion conditions in northwestern New Mexico. Shows how negligence of the local Navajo Indians has resulted in overgrazing with its consequent erosion, and reviews the work and program of the Indian Bureau, the Forest Service, and the Civilian Conservation Corps in instituting control measures.

WOOD, IVAN D. (3013)
CONTROL OF EROSION IN THE MIDDLE WEST. 1st Internatl. Cong. Soil Sci., Washington, D. C., Proc. Comn. 6: 746-747. June 13-22. 1927.

Careful pasturing, allowing the natural grasses to regain a foothold, is suggested for wind-erosion control. Strip cropping is also recommended. Leguminous crops and the application of barnyard manure are suggested as a preventive of water erosion. Various types of dams for gully control are also considered.

WOODMAN, V. W. (3014)
PASTURE DEVELOPMENT IN TEXAS. 6th Southwest Soil and Water Conservation Conf., Tyler, Tex., Proc. pp. 55-60. 1935.

"Both permanent and temporary pastures, or supplementary feed crops, are necessary for the maximum benefit from the grazing areas, and to establish a proper rotation and strip-cropping system which in turn fits into a program of maintaining soil fertility and the prevention of soil erosion . . . In general, the methods outlined here in the establishment and management of pastures can be applied to all lands in Texas."

YOUNG, G. E. (3015)
ECONOMIC UTILIZATION OF LAND FOR PASTURE IN SOUTHERN INDIANA. Ind. Agr. Expt. Sta. Bull. 359, 24 pp., illus. 1932.

"Of the total land in farms in Washington County, pasture occupied 36 per cent, harvested crops 31 per cent, idle and waste and woods 33 per cent, according to the 1930 census." Percentage yields from these divisions are given with the average cost of maintenance.

ZINK, F. J. (3016)
DESIGN OF A MACHINE FOR HARVESTING BUFFALO GRASS SEED. Agr. Engin. 17: 197-198, illus. May 1936.

This article describes the final design of a suction machine for harvesting buffalo grass seed. States that "results in harvesting efficiency were

determined by counting the seed on a small area, then sweeping the area and counting the seed remaining . . . While only experimental results are available, there appears to be no reason to doubt the applicability of this machine for extended use."

RUN-OFF AND SOIL LOSS

ANONYMOUS.

(3017)

AN ARTIFICIAL "RAINSTORMER" TO STUDY FLOOD RUN-OFFS. Bull. Amer. Met. Soc. 18: 139-140. March 1937.

Tests made in the Boise, Idaho, section with a rainstorm machine developed by the United States Forest Service show that plant cover has a decided influence upon the amount and character of the flow of mountain streams, which, in the Boise section, are utilized for irrigation. "As one outstanding result, the studies showed that the kind and density of the vegetation is more important in influencing run-off and erosion than is steepness of slope or intensity of rainfall." Not examined.

(3018)

FARMS THAT GO TRAVELING. HOW MUCH OF YOUR GOOD SOIL ARE HEAVY RAINS SENDING DOWN THE RIVER? Wallaces' Farmer 53: 1047. July 27, 1928.

Missouri experiments show that an acre of plow land lost 41.2 tons of soil in a year. The author contends that the same process of devastation is going on in the United States as that which caused the destruction of ancient civilizations in other parts of the world—soil erosion. The practical efforts of farmers in Van Buren County, Iowa, to stop soil erosion are described. The need for sound farming practices is emphasized.

(3019)

SOIL EROSION LOSSES ARE GREAT. Agr. Rev. 19: 8. November 1926.

The author points out that rushing rain water sweeping over the fields carries away 20 times as much plant food material as does growing crops. "There is need at once for a nationwide awakening to the evils of erosion . . ."

(3020)

THE TENNESSEE RIVER EXPERIMENT. Engin. News-Rec. 117: 771-779, illus. December 3, 1936.

This is the first of five articles on the Tennessee Valley Authority, the creation of which in 1933 initiated the first attempt ever made to control and utilize a large river for the benefit of the surrounding region. It was found that the fine-textured soil absorbs water slowly, has rapid run-off, and erodes freely unless protected by adequate ground cover. Soil erosion is startlingly common on the cleared and farmed lands.

(3021)

WATER RUNS DOWN HILL, AS A DESTRUCTIVE FORCE OR LIFE-GIVING BOUNTY. Ind. Farmer's Guide 92: 5, 19, illus. June 20, 1936.

Soil washing and the need for better farm practices to control erosion are stressed. Experiments at Zanesville, Ohio, and in the Mississippi Valley are cited.

ALLISON, R. V.

(3022)

THE IMPORTANCE OF THE VEGETATION FACTOR IN WATER CONSERVATION AND EROSION CONTROL. Amer. Soil Survey Assoc. (Rept. Ann. Meeting 15) Bull. 16: 119-122. May 1935.

Presents results of experiment work at the erosion stations. Specific data are given on the Red Plains station at Guthrie, Okla., as to relation of type of vegetation to run-off and erosion over a 4-year period. The action of organic matter in the soil, gully control, and rotation crops in field practice are discussed. The author suggests a system of differential taxation which would penalize misuse of land.

AMERICAN SOCIETY OF CIVIL ENGINEERS, IRRIGATION DIVISION.

(3023)

REPORT ON PROGRESS . . . CONFERENCE . . . LOS ANGELES, CALIFORNIA, MARCH 13-14, 1935. 102 pp. [Los Angeles.] 1935.

A report of the committee on conservation of water, Irrigation Division, American Society of Civil Engineers. Partial contents: Resolutions Adopted by Conference on Water Conservation, p. 2; Economic Limits of Conser-

vation of Flood Water by Spreading, by K. Q. Volk, pp. 42-44; Runoff from Small Experimental Plots, by F. B. Laverty, pp. 45-63; Measurement of Debris Transported from Burned Areas, by C. W. Sopp, pp. 63-73; The Physical Crisis of Land Use, by W. C. Lowdermilk, pp. 73-77; Safeguards on Denuded Watersheds, by W. V. Mendenhall, pp. 82-87; Runoff and Erosion Experiments in Mountain Areas, by C. J. Kraebel, pp. 87-95; Erosion and Runoff Experiments from Cultivated Areas, by L. A. Jones, pp. 95-101.

ASHPLANT, H.

(3024)

SOIL EROSION. Rubber Growers' Assoc. Bull. 10: 265-273. April 1928.

"With the object of getting definite quantitative information on the amount of soil lost by wash on rubber estates, an experiment was started shortly before the 1927 monsoon." Tables giving full details of soil wash recorded by the Mundakayam Experiment Station are shown. "Reference to Table I shows the loss of soil from an acre of clean weeded rubber to have amounted to 22.22 tons . . ." The comparative influence of legumes and cultural measures in preventing soil erosion are discussed. It was found that "for preventing soil erosion there is nothing better than a natural cover of weeds though it will be apparent that the result from the legumes were quite satisfactory, once the cover had become dense enough."

BAIRD, R. W.

(3025)

RELATION OF RUNOFF TO VERTICAL INTERVAL OF TERRACES. Agr. Engin. 10: 188-189, illus. June 1929.

"One of the problems in the laying out of any system of terraces is the determination of the correct vertical distances between terraces for any given field slope." Data on tests made in Oklahoma for precipitation and run-off are presented in tables.

(3026)

STUDY OF RUN-OFF FROM TERRACED FIELDS. Okla. Agr. Expt. Sta. Cir. 79: 36-38. 1931.

A paper read at the second Southwest Soil and Water Conservation Conference. Describes an experiment at the Oklahoma Experiment Station beginning in 1927, ". . . with the idea of determining which of the various grades and intervals in use for terraces were most effective in retaining soil and water and also noting the ponding caused by flat grades and consequent damage to crops and loss of time in cultivation . . ." The results of the experiment during the year 1929 are presented in four tables.

BARTEL, F. O.

(3027)

FIRST PROGRESS REPORT ON SOIL EROSION EXPERIMENTS, NORTH CAROLINA EXPERIMENT STATION FARM, WEST RALEIGH, WAKE COUNTY, NORTH CAROLINA. U. S. Bur. Pub. Roads, Div. Agri. Engin. 21 pp., illus. 1925.

"Experiments conducted by the North Carolina Experiment Station in cooperation with the U. S. D. A. Bureau of Public Roads to determine the amount of run-off and soil eroded from plats of Cecil fine sandy loam soil of varying lengths and also from plats of equal length when growing different crops are reported . . ."—Expt. Sta. Rec. 55: 778. 1926.

(3028)

RESEARCH IN SOIL EROSION. N. C. Agr. Expt. Sta. Ann. Rept. 54: 50-52. 1931.

Research conducted at the Statesville Soil Erosion Farm included studies of effects of various crops and soil conditions on run-off water and erosional material. Results of rotation cropping of 12 plots is given together with gully treatment through utilization of brush and black locust seedlings.

(3029)

SECOND PROGRESS REPORT ON SOIL EROSION AND RUNOFF EXPERIMENTS IN PIEDMONT, NORTH CAROLINA, JUNE 1, 1925, TO MAY 31, 1926. U. S. Bur. Pub. Roads. 1928. [Mimeographed.]

"The equipment and layout for this experiment as described in detail in the first progress report remained unchanged during the second year." A more detailed description of the soil is given than in the first report."

BARTEL, F. O.

(3030)

SOIL EROSION AND WATER CONSERVATION FACTS FROM THE NORTH CAROLINA EXPERIMENT. *Agr. Engin.* 10: 287-288. September 1929.

Experiments in Piedmont, North Carolina, measuring run-off and erosion from plots of varying lengths and from straight crops, the effect of winter cover crops, and the run-off from terraces are described.

(3031)

THIRD PROGRESS REPORT ON SOIL EROSION AND RUNOFF EXPERIMENTS AT THE NORTH CAROLINA EXPERIMENT STATION FARM, JUNE 1, 1926, TO MAY 31, 1927. U. S. Bur. Pub. Roads. 1928. [Mimeographed.]

This report covers the third year of experimental work in North Carolina. A 3-year period of experiments is summarized and tabulated in which the run-off and soil loss from seven plots were measured.

BAXTER, E. O.

(3032)

RAINFALL INTENSITIES. *Jour. Inst. Munic. and County Engin.* 62: 529-549. November 5, 1935.

The author presents formulas to eliminate possible errors in run-off calculation. He discusses rainfall intensity duration curves and variations of instantaneous intensity and gives equations on the coordination of rainfall-intensity-duration curves.

BENNETT, H. H.

(3033)

DYNAMIC ACTION OF RAINS IN RELATION TO EROSION IN THE HUMID REGION. *Amer. Geophys. Union Trans. Ann. Meeting* 15: 474-488. April 26-28, 1934.

"More than all other physical agencies with which man has any causative association, accelerated erosion is responsible for soil-impoverishment and eventual soil-destruction." This paper discusses "those processes of erosion that pertinently relate to rates of rainfall-absorption, runoff, and soil-removal, and with some of the more important of the numerous variables involved."

(3034)

THE IMPORTANCE OF SOIL CONSERVATION. N. C. Agr. Expt. Sta. *Agron. Inform. Cir.* 63, 12 pp. 1931.

"This is an address delivered July 29, 1931, before the North Carolina Farmers' and Farm Women's Convention, at Raleigh, N. C., discussing work on soil erosion and run-off losses carried out by the U. S. D. A. Bureau of Chemistry and Soils with the cooperation of the North Carolina among other stations. The nature of the problem and of the means available for its solution are indicated, together with some results already attained at various points throughout the country."—*Expt. Sta. Rec.* 66: 617. 1932.

(3035)

THE QUANTITATIVE STUDY OF EROSION TECHNIQUE AND SOME PRELIMINARY RESULTS. *Geogr. Rev.* 23: 423-432, illus. July 1933.

An account of 10 major soil-erosion and moisture-conservation experiment stations established by the Bureau of Chemistry and Soils. The University of Missouri has a station near Columbia, Mo., and similar experimental work is being done at the Texas Agricultural Experiment Station at Spur. A working plan for study of processes of erosion and run-off and methods of control had been drawn up by the writer in 1926. This plan was adhered to. "Quantitative measurements of losses of soil, water, plant food, organic matter, and colloids are made by catching all the run-off from slopes of different gradients and lengths, using plots of as nearly uniform soil as can be found."

BROOKS, C. E. P.

(3036)

THE INFLUENCE OF FORESTS ON RAINFALL AND RUN-OFF. *Quart. Jour. Roy. Met. Soc.* 54: 1-17, illus. 1928.

"Reviewing the work of others on this subject, the author sums up the influence of forests on rainfall and run-off as follows: "The replacement of forests by field crops or grassland probably tends to increase the general rainfall of the district slightly; their replacement by bare ground probably tends to decrease the general rainfall slightly . . ."—*Expt. Sta. Rec.* 59: 507. 1928.

CLYDE, G. D.

(3037)

SNOW-MELTING CHARACTERISTICS. Utah Agr. Expt. Sta. Bull. 231, 48 pp., illus. 1931.

"The object of this study is to determine those factors which affect the snow-melting characteristics and the relationship of these characteristics to run-off and watershed losses."

CONNER, A. B., DICKSON, R. E., AND SCOATES, D.

FACTORS INFLUENCING RUN-OFF AND SOIL EROSION. Tex. Agr. Expt. Sta. Bull. 411, 50 pp., illus. 1930.

"This bulletin reports results so far available from three years' work at Substation No. 7, located near Spur, Dickens County [Tex.], in a study of factors influencing run-off and soil erosion and the effects of conservation on the increase in crop yields. The results are directly applicable to an area of about 14 million acres in which Miles and Abilene soils predominate and indirectly applicable to all of Texas. The equipment used is fully described . . ."

DANFORTH, G. C.

(3039)

RAINFALL CHARACTERISTICS AND THEIR RELATION TO SOILS AND RUNOFF. Amer. Soc. Civ. Engin. Proc. 56 (pt. 1): 1707-1711. September 1930.

DEETER, E. B.

(3040)

ONE HARD RAIN DID THIS. Soil Conserv. 1:9. August 1935.

"The rainfall of April 2, [1935] ranging at different places from 1.09 to 1.72 inches, produced some striking results. The rate of intensity was approximately 4 inches per hour." Discusses resultant washing away of soil. Data compiled at the soil erosion experiment station, Temple, Tex.

DEVEREAUX, W. C.

(3041)

RELATION OF DEFORESTATION TO PRECIPITATION AND RUNOFF IN WISCONSIN. U. S. Monthly Weather Rev. 38: 720-723, illus. May 1910.

Some of the different phases of this question are considered as applied to the Wisconsin River Valley above Portage and the Wolf River Valley above New London. Topography and soil, the original forest and the clearing of the forests, together with rainfall data and run-off, are all discussed. In his conclusions the writer states that deforestation has had no appreciable effect on the precipitation, and that deforestation proper has not changed the stream flow, but farm drainage and the improvement of the small streams may have increased the rate of run-off slightly.

DICKSON, R. E.

(3042)

RESULTS AND SIGNIFICANCE OF THE SPUR (TEXAS) RUN-OFF AND EROSION EXPERIMENTS. Jour. Amer. Soc. Agron. 21: 415-422. April 1929.

The plan of experiment and the results are described in detail by the author in a paper read at the meeting of the American Society of Agronomy, Washington, D. C., November 23, 1928. Distribution of rainfall during the major portion of 3 crop years, in relation to water and soil loss, is shown by tables. In summing up, the author states: "With a better understanding of the nature and character of the rainfall and . . . development of practical methods of holding the water on the land where it falls, there will be more permanently anchored acres and the risk element of crop farming will have been materially reduced."

(3043)

SOIL MOISTURE AND FERTILITY CONSERVATION. Agr. Engin. 10: 285-287, illus. September 1929.

"There is probably no other service that the engineers of the country can render agriculture that is comparable with a complete study of the water and soil conservation problems. There is certainly no other way in which the agricultural wealth of the country can be so quickly and materially increased, and there is no program so lasting in its good results." Experiments to determine the duty of water as applied to the growing of crops have been made at Spur, Tex., since 1926. Rainfall data, records of run-off, and the tons of soil eroded per acre are given.

DICKSON, R. E. AND LANGLEY, B. C.

(3044)

RUNOFF AND SOIL EROSION STUDIES. Tex. Agr. Expt. Sta. Ann. Rept. 44: 140-141. 1931.

"This project which has been under way five years, has for its purpose the study of factors influencing run-off-water losses and soil erosion and the effect of run-off and erosion on crop production." Results obtained from terraces, contour rows, and the use of alfalfa for diverting run-off water are given.

— AND LANGLEY, B. C.

(3045)

RUN-OFF WATER LOSSES IN RELATION TO CROP PRODUCTION. Tex. Agr. Expt. Sta. Ann. Rept. 48: 63-64. 1935.

Reports the results of studies conducted at agricultural experiment substation No. 7, at Spur, Tex. The experiments are conducted on small plots one seventy-fifth of an acre in size and large field areas from 6 to 120 acres.

— AND SCOATES, D.

(3046)

RUNOFF WATER LOSSES IN RELATION TO CROP PRODUCTION. Tex. Agr. Expt. Sta. Rept. 1930: 51-52. 1930.

"The results obtained to date in these studies show that rapidity of rainfall is a factor involved in losses of both water and soil and that the greatest losses occur from torrential rains . . . Tillage has increased the absorptive power of the soil for water and consequently has been effective in storing water in the soil." Vegetative cover of cotton, milo, and grass on terraced land is advocated.

— SCOATES, D., AND LANGLEY, B. C.

(3047)

RUN-OFF WATER LOSSES IN RELATION TO CROP PRODUCTION. Tex. Agr. Expt. Sta. Ann. Rept. 44: 50-51. 1931.

"The purpose of this project is to study some of the factors influencing run-off and soil erosion and the effects of preventing the losses of water by run-off on crop production. The work includes terraces with different slopes and vertical spacing, different crops as vegetative cover, different slopes on land, and the diversion of water on diked areas."

DISEKER, E. G., AND YODER, R. E.

(3048)

SHEET EROSION STUDIES ON CECIL CLAY. Ala. Agr. Expt. Bull. 245, 52 pp., illus. 1936.

"It is apparent that sheet erosion control must be considered as a 'between-terrace' problem since the land between terraces constitutes the unit areas from which run-off occurs." The authors advocate three supplemental measures from which erosion control may be developed; (1) Increased and improved use of vegetation; (2) improved methods of tillage and mechanical manipulation of the soil; and (3) a wiser selection and use of land for the production of clean-cultivated crops. Results of 6 years' experimentation on the measurement and control of the sheet erosion process on Cecil clay are reported.

DODGE, A. F.

(3049)

MEASUREMENT OF RUN-OFF AS INFLUENCED BY PLANT COVER DENSITY. Iowa State Col. Jour. Sci. 9: 399-407. 1935.

"Little is known concerning the influence of plant cover density on run-off and erosional losses in southern Iowa, where farming practice has greatly reduced the area of undisturbed forest litter and the original prairie vegetation, both of which were efficient in maintaining the soil in a stable and water-receptive state . . . In 1932 an attempt was made to measure the value of different vegetative covers in preventing run-off losses. The observations and data obtained are recorded, following a description of the methods and plots"

DRUMMOND, G. B.

(3050)

NOMOGRAPHIC SOLUTION OF THE RATIONAL RUN-OFF FORMULA. Agr. Engin. 16: 13, illus. January 1935.

- DUCKER, H. C. (3051)
SOIL EROSION PROBLEMS OF THE MAKWAPALA AND PORT HERALD EXPERIMENT STATIONS, NYASALAND. *Empire Cotton Growing Rev.* 8: 10-15. 1931.
This is a report on the results of studies conducted at the Makwapala station on run-off and soil washing, terracing, and resistance crops. Soil conditions at the Port Herald station are discussed.
- DULEY, F. L. (3052)
CONTROLLING SURFACE EROSION ON FARM LANDS. *Mo. Agr. Expt. Sta. Bull.* 211, 23 pp., illus. 1924.
"This report presents the practical features of studies conducted over a 6-year period on the measurement of run-off and losses from soil erosion previously reported in *Research Bull.* 63 (*E. S. R.* 51, p. 210). It has been found that deep plowing to 8 inches is only slightly more effective than shallow plowing to 4 inches in preventing run-off and erosion. A growing crop on the land, particularly a small grain or sod crop, furnished the most effective means of reducing erosion. The character of the rainfall largely determined the amount of soil loss. A heavy dashing rain removed more soil within a few hours than was lost during a whole year when the rainfall was well distributed. Grass or clover land absorbed much more water than cultivated land."—*Expt. Sta. Rec.* 51: 618. 1924.
- THE LOSS OF SOLUBLE SALTS IN RUNOFF WATER. *Soil Sci.* 21: 401-409. May 1926. (3053)
"This paper covers determinations made on the run-off water from the erosion plots having different cultural and crop treatments during the year May 1, 1924 to April 30, 1925. This must be considered as a progress report, since the samples are still being collected and further determinations will be made in the future." The plan of the work is given, and the treatments of the various plots in the experiment. Results are given in tables and are followed by a summary.
- SOIL EROSION OF SOYBEAN LAND. *Jour. Amer. Soc. Agron.* 17: 800-803. December 1925. (3054)
Experiments in measuring loss of soil under soybean cultivation in Missouri have shown that the loss from this land was relatively high as compared with sod or corn after clover. Tables give the amounts of soil lost during different periods, and the amounts of nitrogen lost in eroded soil from soybean land.
- AND ACKERMAN, F. G. (3055)
RUN-OFF AND EROSION FROM PLOTS OF DIFFERENT LENGTHS. *Jour. Agr. Research* 48: 505-510, illus. 1934.
This article describes two sets of experiments conducted at the Kansas Experiment Station. "In each, 4 plots 3 feet wide and 10, 20, 40, and 100 feet long were used . . . The slope of the land was 4 percent in experiment 1 and 4.4 percent in experiment 2 . . ." A table on the effect of length of slope on run-off and soil erosion for each experiment is included with a brief summary of data.
- AND HAYS, O. E. (3056)
THE EFFECT OF THE DEGREE OF SLOPE ON RUN-OFF AND SOIL EROSION. *Jour. Agr. Research* 45: 349-360, illus. 1932.
"Studies conducted at the Kansas Experiment Station are reported in which determinations of run-off and erosion were made by means of water applied to soil artificially to simulate rainfall . . ."—*Expt. Sta. Rec.* 68: 389. 1933.
- AND MILLER, M. F. (3057)
EROSION AND SURFACE RUN OFF UNDER DIFFERENT SOIL CONDITIONS. *Mo. Agr. Expt. Sta. Research Bull.* 63, 50 pp., illus. 1923.
"Experiments covering a 6-year period are described in which the amount of run-off and soil eroded were measured after each rain from seven plats having different cropping systems or tillage treatment . . . The results as a whole are taken to indicate that much can be done in the Corn Belt toward reducing run-off and the disastrous effects of erosion by planning

crop rotation in such a way that the land will be covered with a growing crop a very large portion of the time."—Expt. Sta. Rec. 51: 210. 1924.

FIFTERT, C. H. (3058)

PREDICTION OF RUNOFF AIDED BY GROUPING RAINFALL DATA. COMBINING THE RECORDS OF AREAS POSSESSING UNIFORM RAINFALL CHARACTERISTICS TO PRODUCE A SINGLE RECORD FOR THE TOTAL NUMBER OF YEARS COVERED MAKES POSSIBLE LONG-RANGE PREDICTION OF EXCESSIVE PRECIPITATION. Engin. News-Rec. 117: 917-919. December 31, 1936.

"The purpose of this article is to make the data and the methods employed more helpful and to urge engineers to use and test them more extensively." Reference is made to Storm Rainfall of Eastern United States issued by the Miami Conservancy District, chapter V of which deals with frequency of excessive precipitation, making use of isoluvial charts and pluvial indices.

FINNELL, H. H. (3059)

RUNOFF CONSERVATION. Okla. Agr. Expt. Sta. Rept. 1926-30: 325-326. 1930.

"The 1930 results from terracing, average of all plots, showed an increase in crop production of 16 percent . . . Additional work was begun in 1929 to determine the efficiency of various spacings of level terraces for moisture conservation . . ."

FITZGERALD, O. A. (3060)

FOOLING JUPITER PLUVIUS. West. Farm Life 38: 19. June 15, 1936.

Describes portable fire pump devised to produce artificial rains for run-off study. An outstanding result of the study was that kind and density of vegetation is a more important influence on run-off and erosion than is steepness of slope or intensity of rainfall.

FOLLANSBEE, ROBERT. (3061)

SOME CHARACTERISTICS OF RUN-OFF IN THE ROCKY MOUNTAIN REGION. U. S. Geol. Survey Water-Supply Paper 500: 55-71. 1922.

"For the last nine years the United States Geological Survey has made a special study of the run-off of mountain streams, particularly in Colorado and Wyoming. The gradual installation of water-stage recorders on the larger streams has made available sufficient data to permit a study of the characteristics of these streams. During this period 40 or more stations located in the mountains and above practically all diversions, have been maintained for periods ranging from two to eight years or more, and the records thus obtained, together with studies of the topography of the drainage basins, form the basis of this report."

(3062)

VARIATIONS IN ANNUAL RUN-OFF IN THE ROCKY MOUNTAIN REGION. U. S. Geol. Survey Water-Supply Paper 520: 1-4. 1925.

"The data presented in this report show that the variation in annual run-off differs in different areas in the Rocky Mountain region, owing to the differences in the sources of the precipitation on those areas." Tables give comparative figures on run-off for streams in Montana, Wyoming, and Colorado. The influence of topography upon variation in annual run-off is also discussed.

FORSLING, C. L. (3063)

A STUDY OF THE INFLUENCE OF HERBACEOUS PLANT COVER ON SURFACE RUN-OFF AND SOIL EROSION IN RELATION TO GRAZING ON THE WASATCH PLATEAU IN UTAH. U. S. Dept. Agr. Tech. Bull. 220, 72 pp., illus. 1931.

"This is a contribution from the Intermountain Forest and Range Experiment Station of the U. S. D. A. Forest Service. It presents the results of 15 years' measurements of precipitation, surface run-off, and erosion from summer rains and 7 years' measurements of melted snow run-off and erosion on two experimental watersheds on the Wasatch Plateau in central Utah."—Expt. Sta. Rec. 65: 477. 1931.

FREE, G. R. (3064)

A COMPARISON OF SOIL MOISTURE UNDER CONTINUOUS CORN AND BLUEGRASS SOD. Jour. Amer. Soc. Agron. 28: 359-363. May 1936.

Describes experiments carried out at the soil erosion experiment station, Clarinda, Iowa, to determine soil and water losses from corn, bluegrass sod,

and other crops. Results are presented in tables. The conclusion is that "soil moisture in a 3-foot profile under continuous corn has been significantly more than that under bluegrass sod despite a difference in run-off of 5.51 surface inches."

FREE, G. R., AND MUSGRAVE, G. W. (3065)

A PRELIMINARY REPORT OF AN INFILTRATION STUDY OF SOME PIEDMONT AND COASTAL PLAIN SOILS. U. S. Soil Conserv. Serv. SCS-TP-13, 8 pp. Washington, D. C. May 1937. [Mimeographed.]

"These considerations give rise to the possibility that on the soils with high infiltration rates wider spacings of terraces may be used, that outlet ditches may be constructed to care for a lesser volume of water, that wider intervals in strip cropping are practicable, and that, in general, treatments to control erosion and run-off may be less vigorous provided rainfall, vegetative cover, degree of slope, and similar factors are the same as on soils with lower infiltration rates."

GEIB, H. V. (3066)

A NEW TYPE OF INSTALLATION FOR MEASURING SOIL AND WATER LOSSES FROM CONTROL PLATS. Jour. Amer. Soc. Agron. 25: 429-440, illus. July 1933.

A description is given of divisor boxes and their installation now being used on soil-erosion and moisture-conservation control plots on the Blackland experiment station at Temple, Tex.

GLASSPOOLE, J. (3067)

RAINFALL, RUN-OFF, AND EVAPORATION. Met. Mag. [London] 63: 70-72. April 1928.

Discussion of a paper by Axel Wallen, Eau Tombee, Debit et Evaporation Dans la Suede Meridionale (Geografiska Ann. 9: 181-208. 1927). Measurements were taken in 11 catchment areas in the southern half of Sweden. It is stated that the presence of snow has a tendency to affect the accuracy of such experiments.

GREGORY, R. L., AND ARNOLD, C. E. (3068)

RUN-OFF—RATIONAL RUN-OFF FORMULAS. Amer. Soc. Civ. Engin. Trans. 96 (paper 1812): 1038-1099. 1932.

"A discussion of methods of estimating storm-water run-off, statements, conclusions and comparisons, weighing of errors, advantages and disadvantages, and suggestions for improvement form an important part of this paper . . . the paper is divided into two parts. Part I contains an analysis of the factors involved; it presents conclusions, and proposes changes in the present methods of estimating run-off. Part II contains a series of derivations, introducing and advocating new factors and formulas."

GRIFFITH, J. R. (3069)

RUNOFF FOR CULVERT DESIGN IN FARMING COUNTRY. Highway Mag. 27: 115, illus. May 1936.

The Burkli-Ziegler formula for computing the run-off expectancy from a given watershed is presented as the one of most universal application.

GRUNSKY, C. E. (3070)

RAINFALL AND RUNOFF STUDIES. Amer. Soc. Civ. Engin. Trans. 85: 66-136. 1922.

Paper presented at the meeting of October 5, 1921, gives data showing the range of precipitation in central California. The effect of altitude on intensity of rainfall and on run-off is presented along with formulas for calculating storm-water flow.

GUTMANN, I. (3071)

NEW CLOUDBURST FLOOD FORMULA. Engin. News-Rec. 117: 474-475, 665. 1936.

"A proposed discharge formula for limited areas that fits well with runoff records of phenomenal floods in this country and abroad."

The formula contained in Gutmann's article is discredited by J. W. Pritchett and G. C. Commons in a letter to the editor, page 655. They think that the use of this formula would sooner or later lead to disaster. An accompanying table gives maximum measured peak discharges in Texas. Run-off data plotted from this table indicates a maximum expected flow six times greater than that shown in the originally proposed formula.

HARDMAN, GEORGE, AND REIL, O. E. (3072)

THE RELATIONSHIP BETWEEN TREE-GROWTH AND STREAM RUNOFF IN THE TRUCKEE RIVER BASIN, CALIFORNIA-NEVADA. Nev. Agr. Expt. Sta. Bull. 141, 38 pp., illus. 1936.

Precipitation has a similar effect on both tree growth and stream run-off, which can be estimated from tree growth. Tree-growth curves show constantly recurring periods of varying length when the precipitation and run-off may be either far above or below the average.

HATHAWAY, G. A. (3073)

SNOW SURVEYS PREDICT RUNOFF. Engin. News-Rec. 116: 728-730. May 21, 1936.

"Stream discharges in upper Missouri River Valley accurately forecast last year from studies or condition of snowfields, which will be continued as guide to future operation of Fort Peck reservoir."

HAYS, ORVILLE E. (3074)

LAND USAGE AND EROSION. Save Our Soil 1: 3-4. June 1936.

Describes experimental research data on run-off control plots at the Upper Mississippi Valley Soil Conservation Experiment Station, La Crosse, Wis.

HAZEN, L. E. (3075)

HANDLING RUN-OFF FROM TERRACED FIELDS. Okla. Agr. Expt. Sta. Cir. 79: 55-57. 1931.

A paper read at the second Southwest Soil and Water Conservation Conference. Emphasizes five major factors in the construction of terraces and discusses supplementary structures for disposing of run-off.

(3076)

TERRACES CONTROL SOIL WASHING. Okla. Agr. Expt. Sta. [Bien.] Rept. 1931-32: 275-277, illus. 1932.

"The Oklahoma Agricultural Experiment Station is establishing setups to determine the relative influence of vertical interval and gradient on the run-off and silt content of water at the point of discharge. Twelve gauging stations equipped with weirs and clock actuated float gauges have been established . . ." The results of the experiment are briefly outlined, and a table on effect of gradient and vertical interval on high flood stage at terrace outlets is included.

HENDRICKSON, B. H. (3077)

THE CHOKING OF PORE-SPACE IN THE SOIL AND ITS RELATION TO RUNOFF AND EROSION. Amer. Geophys. Union Trans. 15: 500-505. April 26-28, 1934.

Investigations in progress at the soil erosion station at Tyler, Tex. Results and laboratory experiments for studying the rate of infiltration of water are also discussed. Controlled plot experiments are described in detail with tables giving data on run-off and erosion.

—AND BAIRD, R. W. (3078)

SOIL EROSION STUDIES. Tex. Agr. Expt. Sta. Ann. Rept. 44: 113-116. 1931.

Run-off and erosion data on several control plots are given. "It is apparent that run off and erosion losses are highest on corn and cotton land, moderate in the case of lespedeza, and very low with sod. Extensive tests are in progress in an attempt to find practical means of establishing good upland permanent pastures, or substitute upland hay and feed crop rotations of erosion-resistant types." Studies on types of terraces are presented.

HINDERLIDER, M. C. (3079)

RAINFALL AND RUNOFF IN COLORADO. Engin. News-Rec. 117: 243-247, illus. August 13, 1936.

Reports the results of special investigations to accumulate hydrographic data of heavy rainfall and run-off in drainage basins in eastern Colorado, the data to be used in designing future storage reservoirs for areas of unusual rainfall intensities.

HOLLAND, T. H.

(3080)

SOIL EROSION EXPERIMENTS ON THE EXPERIMENT STATION, PERADENIYA. Trop. Agr. [Ceylon] 64: 360-361. June 1925.

"It is proposed to build cemented pits of a size to be determined by previous experiment with earth pits, to catch the wash at the bottom of each plot . . . The pits must be fully large enough to take all water and silt which comes down the slope and roofed in to prevent direct entrance of water. They must be impervious but provided with a drain plug; absolutely level and of uniform cross section." A method for measuring results is suggested.

—AND JOACHIM, A. W. R.

(3081)

A SOIL EROSION EXPERIMENT. Trop. Agr. [Ceylon] 80: 199-207, illus. April 1933.

Work was started on the experiment in July 1925, and the actual recording of erosion began June 1, 1926. The plan of a single plot is illustrated. The losses of soil from plots under treatment are shown with other figures of interest in table 1, while a graph shows the actual soil losses over the whole period. Rainfall figures are also included. Analytical data are given in tables.

HORNER, W. W., AND FLYNT, L. K.

(3082)

RELATION BETWEEN RAINFALL AND RUN-OFF FROM SMALL URBAN AREAS. Amer. Soc. Civ. Engin. Proc. 62 (Paper 1926): 140-206. October 1936.

Includes discussions by F. F. Snyder, M. M. Bernard, L. K. Sherman, W. W. Horner, and F. L. Flynt, Part I.—Study of the Run-Off Factor by the Unit-Graph Method. Part II.—Frequency Study of Run-Off Rates. The results of research into the relation between rainfall and run-off from small urban areas in St Louis are here presented as specific studies of the run-off from parts of two different city blocks tributary to street inlets and from both roofs and ground surface of another entire city block. Results from measurements of rainfall and storm flow for practically all heavy rains occurring from 1914 to 1933 are recorded.

HORTON, ROBERT E.

(3083)

COMPUTING RUNOFF FROM RAINFALL AND OTHER PHYSICAL DATA. Amer. Soc. Civ. Engin. Trans. 59: 1166-1173. 1915.

"Describes five methods for extending and estimating runoff records: (1) the standard river method, (2) direct comparative method, (3) rainfall percentage method, (4) the use of runoff formulas, (5) rainfall-water loss methods."—Horton Hydrologic Lab. Pub. 112: 17. 1937.

(3084)

DERIVATION OF RUNOFF FROM RAINFALL DATA. Amer. Soc. Civ. Engin. Trans. 77: 369-375. 1914.

"Describes the contour method of determining mean slope of a drainage basin; points out the utility of records from experimental plats or small areas for the purpose of determining the effect of different factors on runoff, and cites the experiments of Wolny."—Horton Hydrologic Lab. Pub. 112: 16. 1937.

HOUK, IVAN E.

(3085)

RAINFALL ABSORPTION AND RUNOFF ON SMALL RURAL DRAINAGE AREA. Engin. News-Rec. 82: 875-876. May 1, 1919.

This is a study of heavy rains, total run-off, and soil absorption on small plots in Ohio.

HOYT, W. G., AND OTHERS.

(3086)

STUDIES OF RELATION OF RAINFALL AND RUN-OFF IN THE UNITED STATES. U. S. Geol. Survey Water-Supply Paper 772, 301 pp., illus. 1936.

"Early in its consideration of Public Works water projects, the Mississippi Valley Committee realized the great need for more information on the conditions affecting rainfall, run-off, and related factors . . . It was with an appreciation of the need and opportunity thus afforded that the present studies were undertaken . . . The objective has been primarily the presentation of facts, generally elementary and basic, as disclosed by

observed data or by their simple analysis. It is believed that the results contained in this report present much fundamental information, an understanding of which is essential to adequate long-time planning and execution of projects for the use and control of the water resources of the country."

INTERSTATE COMMITTEE ON THE RED RIVER OF THE NORTH DRAINAGE BASIN.

(3087)
REPORT . . . DECEMBER 1, 1936. 124 pp., illus. [Minneapolis, Minn.] 1936.
[Mimeographed.]

Headings are: Physical Characteristics; Climatology; Economic History, Present Status and Trends; Water Problems and Water Plan; Projects and Program. Data on run-off are given on page 11.

JACOB, JOSEPH.

(3088)
SOME RANDOM NOTES ON RAINFALL AND RUNOFF IN THE STATE OF WASHINGTON.
Amer. Met. Soc. Bull. 17: 363-364. December 1936.

Abstract by L. C. Fisher of paper read at Seattle meeting, American Meteorological Society, 1936.

JONES, L. A.

(3089)
DRAINAGE INVESTIGATIONS BY THE UNITED STATES DEPARTMENT OF AGRICULTURE.
U. S. Bur. Agr. Engin. Drainage 2, 16 pp. 1936. [Mimeographed.]

Paper delivered before the fiftieth anniversary convention of the Illinois Society of Engineers at Urbana, Ill., January 30, 1936. Subjects covered are: Run-off investigations; hydraulic factors of drainage channels; rain-fall intensity-frequency data; and soil-erosion control.

KRUG, GEORGE.

(3090)
HOLDING THE RUNOFF. Mont. Farmer 23: 14. May 1, 1936.

Describes development of an irrigation system on the author's ranch which is located at the mouth of Cabin Creek which joins the Yellowstone River 16 miles southwest of Glendive, Mont. Not examined.

LEACH, H. R., COOK, H. L., AND HORTON, ROBERT E.

(3091)
STORM FLOW PREDICTION. Amer. Geophys. Union Trans. 1933: 435-436. 1933.

"The purpose of this paper is to show the utility of a small runoff plat or plats on a drainage basin in predicting total runoff in a given storm. Such plats, by providing surface runoff coincident with rainfall, and eliminating time lag, afford a basis for determining total runoff quickly and accurately as soon as rain ends. Details of the method, including separation of ground water from surface runoff, and determination of infiltration-capacity, are given; also an example of the application of the method to estimation of storm runoff on Iowa River from Ralston Creek gagings. Estimation of runoff from melting snow under winter conditions is also considered."—Horton Hydrologic Lab. Pub. 112: 22. 1937.

LEWIS, H. G., AND RIESBOL, H. S.

(3092)
OUTLINE OF INVESTIGATIONS AND SUMMARY OF RESULTS 1930-1935. Red Plains Soil Erosion Expt. Sta., Guthrie, Okla. 18 pp., illus. Feb. 1, 1936. [Mimeographed.]

This 5-year study embraced the following investigations: The relation of soil type, slope, cultivation, and treatment, to run-off and soil losses; the relation of vegetative cover such as grass, forest, or other natural protection, to run-off and soil losses; the relation of mechanical methods, to run-off and soil losses. A year's additional data is presented in a supplement.

LOWDERMILK, W. C.

(3093)
FACTORS INFLUENCING THE SURFACE RUNOFF OF RAIN WATERS. 3d Pan-Pacific Sci. Cong., Tokyo, Proc. 2: 2122-2148, illus. 1926.

The author found erosion of slope soils in the mountains and plains of Shantung ". . . to be far above the normal, or above what would occur if the vegetative cover of the prehuman era had remained unmodified . . ." Results are shown of investigations made to determine quantitatively the difference in the capacities to absorb rain waters by soil layers derived from natural vegetation and by denuded slopes.

LOWDERMILK, W. C.

(3094)

INFLUENCE OF FOREST LITTER ON RUN-OFF, PERCOLATION, AND EROSION. *Jour. Forestry* 28: 474-491, illus. April 1930.

"Experiments conducted by the California Forest Experiment Station showed that burned surfaces had a greater run-off in every instance than did litter-covered areas. The litter was most effective when overlying fine-textured soil. After a year's service litter apparently gained in effectiveness in aiding rain penetration, a fact associated with the activity of soil fauna. Forest litter continued to function in approximately the same degree irrespective of the length of the rain . . . The capacity of forest litter to absorb rainfall is deemed an insignificant factor as compared with its function in maintaining the maximum percolating capacity of the underlying soil."—Expt. Sta. Rec. 63: 739. 1930.

(3095)

STUDIES OF THE ROLE OF FOREST VEGETATION ON SURFICIAL RUN-OFF AND SOIL EROSION. *Agr. Engin.* 12: 107-112, illus. April 1931.

"The object of the studies reported in part in this paper is to evaluate, in accordance with scientific method, factors affecting surficial run-off and erosion chiefly from forest soils." The author treats of interdependence of vegetation and soil, accelerated erosion, gradient of slope and intensity of rain, erosion pavement, and the place of cultivation on surficial run-off and erosion.

—, AND ROWE, P. B.

(3096)

STILL FURTHER STUDIES ON ABSORPTION OF RAINFALL IN ITS RELATION TO SURFICIAL RUNOFF AND EROSION. *Amr. Geophys. Union Trans.* 15: 509-515, illus. 1934.

"The studies begun in China by the senior author in 1924 . . . have been continued in California." Conclusions from these studies and experimentation by the California Forest Experiment Station at the North Fork installations are discussed. Tables are given of profile characteristics of Sierra soil series, and the experimental procedure and results are described and illustrated. "From the data yielded . . . it may be concluded that a mantle of undisturbed vegetation serves in heavy rain storms to maintain the soil at high rates of absorption of rainfall, and that barring the soil of its natural cover of vegetation under the conditions of the experiment increases surficial runoff. With increase of surficial runoff soil-erosion is increased, or accelerated far above the rate which took place under the control of a mantle of natural vegetation of the woodland brush type."

LUTZ, H. J.

(3097)

RUNOFF AND EROSION IN RELATION TO GRASSLAND VEGETATION. *Ecology* 17: 534. July 1936.

Discusses a paper by Weaver and Noll on the influence of grassland vegetation upon surface run-off and erosion and gives a brief description of experiment procedure used in run-off plots.

LYNDE, H. M.

(3098)

PROGRESS REPORT OF RUN-OFF INVESTIGATIONS ON THIRD CREEK, IREDELL COUNTY, N. C. *N. C. Agr. Expt. Sta. Ann. Rept.* 41: 74-87, illus. 1918.

"The investigations upon which this report is based were conducted for the purpose of determining the relation existing between rainfall and run-off from drainage districts in the Piedmont section of the southern States. They were conducted on a canal dredged through Third Creek Valley, Iredell County, N. C., and cover a period of approximately five years and nine months, from March 17, 1913 to December 31, 1918 . . ."

(3099)

RUNOFF FROM UNDRAINED LAND AND ACTION OF TILE DRAINS ON GROUND WATER LEVEL. *Engin. and Contract.* 55: 229-231. March 9, 1921.

A study was made of the practical relation of soil character, rate of lowering of the water table, size, depth, spacing, and grade of drains, rates of run-off and rainfall, climate, and topography, to the successful operation of the drainage system. Results of experiments are diagrammatically presented.

McCRORY, S. H. (3100)

RUNOFF INVESTIGATIONS FROM SMALL AGRICULTURAL AREAS. Amer. Geophys. Union Trans. 1933: 518-521. 1933.

The first investigations were undertaken in 1911 in southeastern Missouri and western Tennessee. It later became apparent that the ditches must be enlarged and cleaned out if adequate drainage was to be secured. Studies were made in the Boquephalia drainage district from which valuable information was secured for the designing of ditches and in determining the necessary amount of run-off. "The control of soil-erosion is, in the last analysis, largely a matter of the control of surface-runoff." Experiments on cultivated terraced and untterraced lands are being made at various stations, and "valuable information as to the effect of tilth of the soil, effect of different types of cover, and cultural practices upon runoff from agricultural lands" will be forthcoming. A table shows the relation of rainfall to surface run-off for given storm periods.

McHARGUE, J. S., AND PETER, A. M. (3101)

THE REMOVAL OF MINERAL PLANT-FOOD BY NATURAL DRAINAGE WATERS. Ky. Agr. Expt. Sta. Research Bull. 237, pp. 331-362, illus. 1921.

Experiments conducted at the Kentucky Agricultural Experiment Station proving that greater quantities of the mineral nutrients are leached from a bare soil by drainage than from a similar soil bearing a crop. "... it is a very common practice among farmers to allow a part, if not all, of the land on which corn has been grown to remain without a cover crop until the following spring, with the result that very serious losses of mineral nutrients occur, in the meantime, thru erosion and leaching by drainage waters."

MEGINNIS, H. G. (3102)

EFFECT OF COVER ON SURFACE RUN-OFF AND EROSION IN THE LOESSIAL UPLANDS OF MISSISSIPPI. U. S. Dept. Agr. Cir. 347, 15 pp. 1935.

Run-off and erosion measurements made by the Southern Forest Experiment Station in 1929 are presented.

MILLER, M. F., AND DULEY, F. L. (3103)

STUDIES OF WATER ABSORPTION, RUNOFF, PERCOLATION, EVAPORATION, CAPILLARY WATER MOVEMENT AND SOIL EROSION UNDER FIELD CONDITIONS. Mo. Agr. Expt. Sta. (Ann. Rept. 1919-20) Bull. 172: 40-41. 1920; (Ann. Rept. 1920-21) Bull. 189: 54. 1921.

"The results of 2 years experiments by Miller and Duley on run-off and absorption of rain water showed that land plowed 8 inches deep lost nearly two and one-half times as much soil as land having no cultivation. Land plowed 4 inches deep lost nearly as much as that plowed 8 inches deep. Sod land was most efficient in preventing erosion and absorbed a greater percentage of the rainfall than any of the other soils. Land continuously cropped to wheat was almost as efficient in this respect as sod land, but lost considerable soil when the land was first broken. Land having rotations of corn, wheat, and clover lost very little soil except during the time it was growing corn. Land continuously cropped to corn lost about the same amount of soil as uncultivated land and less than half as much as that plowed to the same depth and having no crop."—Expt. Sta. Rec. 43: 721. 1920.

"Studies by Miller and Duley on water absorption, run-off, percolation, evaporation, capillary water movement, and soil erosion under field conditions showed at the end of the fourth year that land which had been plowed 4 inches deep in the spring and fallowed during the remainder of the year lost over 1-inch of the surface soil by erosion. Land in corn every year lost about 0.5 inch, while land in sod lost only 0.01 inch."—Expt. Sta. Rec. 46: 315. 1922.

—, DUDLEY, F. L., AND PRICE, O. B. (3104)

STUDIES OF THE WATER ABSORPTION, RUNOFF, PERCOLATION, EVAPORATION, CAPILLARY WATER MOVEMENT AND SOIL EROSION UNDER FIELD CONDITIONS. Mo. Agr. Expt. Sta. (Ann. Rept. 1921-22) Bull. 197: 84-85. 1922.

"The experiment having to do with soil erosion was designed to determine the effect of different systems of cropping and different systems of soil management upon the amount of runoff and the amount of eroded ma-

terial." Contains a table of comparative losses from erosion with various crops and treatments. A brief analysis of the table is given.

- MILLER, M. F., AND KRUSEKOPF, H. H. (3104)
EROSION OF MISSOURI SOILS. Mo. Agr. Expt. Sta. Bull. 285: 110-111, illus. 1930.

A summary of data collected in an 11-year study of soil erosion and run-off at the Missouri Agricultural Experiment Station.

- AND KRUSEKOPF, H. H. (3105)
THE INFLUENCE OF SYSTEMS OF CROPPING AND METHODS OF CULTURE ON SURFACE RUNOFF AND SOIL EROSION. Mo. Agr. Expt. Sta. Research Bull. 177, 32 pp., illus. 1932.

"An investigation covering a 14-year period is described, the object of which was to determine the influence of different systems of cropping and cultural treatment on surface run-off and soil erosion . . ."—Expt. Sta. Rec. 69: 118. 1933.

- AND KRUSEKOPF, H. H. (3107)
SOIL EROSION. Mo. Agr. Expt. Sta. (Ann. Rept. 1927-28) Bull. 272: 83-84, 1929; (Ann. Rept. 1929-30) Bull. 300: 97, 1931; (Ann. Rept. 1930-31) Bull. 310: 54, 1932.

"In 1927 erosion under corn exceeded that under soybeans by 50 percent, but, according to all the data available, the average erosion of the soybean plot was as bad as that of the plot in continuous corn. The greatest losses in the erosion waters were those of calcium, sulfur, magnesium, and potassium in the order in which the elements are named. Comparatively, the nitrogen loss was small. The percentage of run-off was approximately the same from plots of 6° slope as from plots with 8.5°, but the slightly greater slope underwent more than twice the erosion loss."—Expt. Sta. Rec. 62: 16. 1930.

Bulletin 300 reports that after a 12-year study it was found that the losses from land in continuous corn were almost seven times greater than those from land in rotations. Data are furnished on the erodibility of varying degrees of slopes planted in corn.

In Bulletin 310, a resume of run-off and erosion studies at the Bethany, Mo. experiment station is given.

- MUSGRAVE, G. W. (3108)
THE INFILTRATION CAPACITY OF SOILS IN RELATION TO THE CONTROL OF SURFACE RUNOFF AND EROSION. Jour. Amer. Soc. Agron. 27: 336-345, illus. 1935.

The author discusses the many factors affecting infiltration rates and reports the results for uncultivated moist soil without vegetative cover. "Control measures have been recommended that are practically uniform for entire States, whereas the soils within such areas may require entirely different treatment . . . Before erosion control measures are designed and recommended for general application in the field, their probable effect should first be calculated and the degree of protection which they afford compared with the rainfall records of the area." Illustrations of infiltration apparatus and tables are presented.

- (3109)
SOME RELATIONSHIPS BETWEEN SLOPE-LENGTH, SURFACE RUN-OFF, AND THE SILT-LOAD OF SURFACE RUN-OFF. Amer. Geophys. Union Trans. 16 (pt. 2): 472-478. 1935.

Shows that the relative run-off from slopes of different length is dependent largely upon ratios of rainfall intensity to soil infiltration.

- PEARSE, C. K. (3110)
A SIMPLE DEVICE FOR MEASURING THE ABSORPTION RATES OF SOILS. Science 85: 459-460, illus. May 7, 1937.

"The Intermountain Forest and Range Experiment Station has developed an apparatus to measure the rate of absorption with a minimum of disturbance to the soil. The unit is inexpensive to construct, simple to operate, and its small size and light weight permit the study of soils in their undisturbed state on areas accessible only by foot." A description of the apparatus is given. The author states that this device will be useful in run-off and erosion studies.

PHILLIPS, SAMUEL W.

(3111)

SOIL EROSION WORK OF THE BUREAU OF CHEMISTRY AND SOILS AT GUTHRIE, OKLAHOMA. Okla. Agr. Expt. Sta. Cir. 79: 40-45. 1931.

A paper read at the second Southwest Soil and Water Conservation Conference. Describes the four major projects contained in the program of the Bureau of Chemistry and Soils, which began in 1929 and presents considerable material on the results of the first year's work. Three tables contain data on percentage of run-off and wash, and cotton yields from erosion-control plots.

RAFTER, GEORGE W.

(3112)

THE RELATION OF RAINFALL TO RUN-OFF. U. S. Geol. Survey Water Supply Paper 80, 104 pp. 1903.

Deals with rainfall, its causes and measurement, and its relation to altitude; discusses under run-off, the laws of stream flow, units of measurement, division of streams into classes, and storage in lakes. In computing run-off, Dickens', Ryves', Kutter's, and Cooley's formulas are considered. Vermeule's formula is given for determining the relation between evaporation and annual precipitation. Russel's formula is given for the run-off of the Ohio, upper Mississippi, and middle Missouri Valleys in terms of annual rainfall. Considerable data are given on the movements of ground water, and the relation of forestation to run-off. Tables on run-off and relative data are given for the Muskingum, Genesee, Croton, Sudbury, Hudson, Pequannock, and Connecticut Rivers.

RAMSER, C. E.

(3113)

EROSION PROTECTION BY TERRACING NECESSITATES RUN-OFF WATER DISPOSAL. U. S. Dept. Agr. Yearbook 1935: 184-187, illus. 1935.

This article presents practical information on the disposal of run-off water at the ends of terraces. A system of checks for disposal channels is recommended and described.

(3114)

THE RATIONAL METHOD OF ESTIMATING RUN-OFF FROM SMALL AGRICULTURAL AREAS. Agr. Engin. 10: 351-353, illus. November 1929.

"The rational method is based on the theory that the maximum rate of run-off from a watershed occurs when rainfall from every portion of the watershed is contributing to the flow at the outlet." It is expressed by the formula, $Q = CIA$, which is explained in detail. The frequency and intensity of rainfall for storms of various duration are shown by a diagram. A table gives the results of the measurements of rainfall and run-off for watershed No. 1 on the Murchison farm, near Jackson, Tenn., and illustrates the method employed in tabulating results and the application of the data to a practical problem.

(3115)

RESULTS OF EXPERIMENTS ON EROSION CONTROL ON THE GUTHRIE SOIL EROSION EXPERIMENTAL FARM. Okla. Agr. Expt. Sta. Cir. 79: 46-53. 1931.

A paper read at the second Southwest Soil and Water Conservation Conference. "The experimental work consists principally of a study of run-off water and eroded material from various slopes and soils to determine the plant food, organic matter and soil losses; and of other investigations on different slopes and soils to determine the rates of run-off and extent of erosion on terraced and unterraced lands from which the proper fall, size, vertical spacing and permissible length for terraces can be determined. The effectiveness of terraces in conserving soil moisture is also being studied on fields where the terraces are laid out level and the ends are closed to retain all the water. Investigations on the design and construction of various types of soil-saving dams built of different materials are also being made in their application to reclaiming and controlling gullies . . ." The results of a year's work in these investigations are discussed.

(3116)

RUNOFF FROM SMALL AGRICULTURAL AREAS. Jour. Agr. Research 34: 797-823, illus. May 1927.

"The purpose of the experiments herein recorded was to determine the rates of run-off from small agricultural areas. The results are specially

applicable to the design of open-ditch drainage systems, terrace systems, small diversion ditches, storm-water sewers draining areas consisting partly of farm lands, tile drains with surface inlets, and road culverts where characteristics of the watersheds and other conditions are similar to those herein described." The experiments were conducted near Jackson, Madison County, Tenn.

ROTHROCK, J. T. (3117)

REMOVAL OF THE FERTILE SOIL FROM THE FARM BY WATER. Pa. Dept. Agr. Rept. 1896:396-405, illus. 1896.

A popular discussion of the fertilizing value of the material removed from soil by surface washing and the means of preventing loss from this source. "The two sovereign remedies against washing on the farm are, first, a dense well-matted sward, which should be kept in good condition by frequent top-dressing; or if this fails, a prompt restoration of land rendered unproductive to a forest condition."—Expt. Sta. Rec. 9:932, 1897-98.

SCOATES, D. (3118)

JUPITER PLUVIUS—THIEF. Better Crops With Plant Food 12: 13-16, 59-60, illus. April 1929.

Information as to rainfall and run-off in relation to soil erosion is supplied by the Missouri Agricultural Experiment Station. The loss of soil fertility due to the silting of reservoirs, the need for proper terracing and drainage of lands, and methods for the elimination of soil erosion are discussed. The improvement of agricultural conditions by wide use of the Mangum terrace is stressed.

SHREVE, FORREST. (3119)

RAINFALL, RUNOFF AND SOIL MOISTURE UNDER DESERT CONDITIONS. Ann. Assoc. Amer. Geogr. 24: 131-156. September 1934.

"Under arid conditions the character and seasonal distribution of the precipitation is more important than under moist ones, both with reference to its agency in remodeling the land surface and its role in supplying water for plant and animal life. The influence of rainfall on physiographic processes is direct and immediate, but its relation to the vegetation is through the medium of the soil and is therefore subject to a number of modifying circumstances . . . The following pages embody the results of an investigation of some of the influences operative in a desert of the less pronounced type . . . The investigation of run-off and soil moisture has been made on the part of the grounds of the Desert Laboratory which lies in the floodplain of the Santa Cruz River, and on the adjacent bajada soil."

STEWART, P. H. (3120)

GETTING THE MOST FROM RAINFALL. Nebr. State Bd. Agr. Rept., 1933: 724-737, illus. 1934.

Run-off losses, winter losses of water, and water storage in the soil are considered by the writer who also discusses the root system of field crops. "We are justified in giving careful thought and consideration to soil moisture conservation and relationships."

STREIFF, ABRAHAM. (3121)

NOTES ON ESTIMATING RUN-OFF. U. S. Monthly Weather Rev. 56: 98-99. March 1928.

States that the design of works for control of water requires the estimate of future run-off and outlines an improved procedure for analyzing "long term trends" in rainfall and run-off.

TEXAS AGRICULTURAL EXPERIMENT STATION. (3122)

RUN-OFF AND SOIL-EROSION STUDIES. Tex. Agr. Expt. Sta. Ann. Rept. 42: 121, 124. 1929.

"Measurements of water losses from control plats during the past three years show that 60 per cent of the total losses occurred during the months of July and August, or at a time of the year when plants were making the heaviest demand on the water supply in the soil." Native grass, milo, cotton, and fallowing were found to be most effective in preventing run-off and erosion. Level terraces were found more effective in saving water than were sloped terraces.

TEXAS AGRICULTURAL EXPERIMENT STATION.

(3123)

RUN-OFF WATER LOSSES IN RELATION TO CROP PRODUCTION. Tex. Agr. Expt. Sta. Repts. 40, 58, 59, 97, 98, 1927; 41: 67. 1928.

"The progress results of this study (E. S. R., 57, p. 186) indicate that one of the most important factors concerned in the loss of run-off is the rapidity of the fall of water. The physical condition of the land is apparently another important factor in the water loss, and there seems to be a considerable difference in the losses from lands under different crops. Results indicate that milo is more efficient in this respect than cotton early in the season, depending probably upon the extent to which the crop is taking water from the soil."—Expt. Sta. Rec. 59: 782. 1928.

The total rainfall for the year is given in Report 41. "With every inch of water lost, there was lost approximately three tons per acre of soil by erosion . . ." The influence of land slope in relation to water losses is discussed.

UHLAND, R. E.

(2134)

DIVISOR FOR TAKING ALIQUOTS OF RUN-OFF. Agr. Engin. 14: 186-188, illus. July 1933.

The divisor flume for measuring soil and water losses from large areas is illustrated. The writer believes that large tanks placed at the lower end of controlled plats, so that all the run-off water and contained soil are caught, is the most accurate method for making such measurements.

VANCE, A. M.

(3125)

EXCESSIVE RAINFALL IN TEXAS. Tex. Reclam. Dept. Bull. 25, 149 pp., illus. 1934.

Data on major storms in Texas for the last 40 years are given. Statistics on run-off are presented in chart form, pages 141-149.

WEAVER, J. E., AND NOLL, W. C.

(3126)

COMPARISON OF RUNOFF AND EROSION IN PRAIRIE, PASTURE, AND CULTIVATED LAND. Nebr. Univ. Conserv. and Survey Div. Bull. 11, 37 pp., illus. November 1935.

With overgrazing considered a chief cause of erosion, studies are presented in tables of run-off and erosion from prairie, wheat, alfalfa fields, and bare areas. "Runoff and erosion have been measured from entire watersheds, and, more recently, by the runoff-plot method. Soil is as much a product of vegetation as vegetation is a product of the soil."

— AND NOLL, WILLIAM.

(3127)

MEASUREMENTS OF RUN-OFF AND SOIL EROSION BY A SINGLE INVESTIGATOR. Ecology 16: 1-12, illus. January 1935.

"Water content of soil is not only a factor affecting plants and vegetation directly but one of the most important factors . . . Hence a complete study of water relations should include measurements of run-off as well as water accumulation or run-in from surrounding areas . . ."

WHITE, W. F., JR.

(3128)

THE RELATION OF RAINFALL TO RUN-OFF IN AMERICAN RIVERS. Columbia Univ. School Mines Quart. 35: 35-54. November 1913.

Gives data on the rainfall and run-off in various drainage basins of the United States, discussing whether there are any definite relations between them. Among other findings the conclusion is drawn that ". . . if, of two similar watersheds, one is heavily forested and the other is not, the run-off from the forested basin will exceed that of the other."

WINTERS, N. E.

(3129)

WASHING ROBS MANY OKLAHOMA FARMS. Okla. Agr. Expt. Sta. Rept. 1926-30. 9-13, illus. 1930.

"An erosion survey was carried through 48 out of 77 counties, both gullying and sheet erosion being found a serious danger. The rough land was found to have suffered an erosion damage more severe than that noted on smooth land in the same rainfall belt. Suitable cropping appeared an important aid in the control of erosion. Soil under cotton without winter cover crop lost 15.9 tons from an acre where oats reduced the loss to 3.9 tons, and a sweetclover field lost but 0.5 ton. A part of the same field cultivated clean and weed-free lost more than 17 tons from each acre."—Expt. Sta. Rec. 64: 715. 1931.

WISCONSIN AGRICULTURAL EXPERIMENT STATION.

(3130)

LEARN FACTORS CAUSING DIFFERENCES IN SEVERITY OF SOIL EROSION. Wis. Agr. Expt. Sta. Bull. 428: 62-64. 1934.

"Although the work of the new Upper Mississippi Valley Soil Erosion Experiment station near La Crosse is only partially underway, already there has been secured much new information which throws light on the factors responsible for variations in the amount of erosion under different farm conditions. This experiment station is operated cooperatively by three bureaus of the United States Department of Agriculture and the Wisconsin Agricultural Experiment Station . . ." Phases of the work described are relation of run-off to degree of slope, percentage of run-off in timbered areas, rotation crops, and terracing.

YARNELL, D. L.

(3131)

APPLICATION OF RAINFALL INTENSITY-FREQUENCY DATA. Agr. Engin. 17: 386, 391. September 1936.

This paper, presented before the soil and water conservation division of the American Society of Agricultural Engineers at Chicago, December 1935, discusses several factors, such as the run-off coefficient in the rational formula, the time of concentration of a given watershed, and the construction of flood-frequency curves from rainfall data.

(3132)

RAINFALL INTENSITY—FREQUENCY DATA. U. S. Dept. Agr. Misc. Pub. 204, 67 pp. August 1935.

"The purpose of this investigation was to determine the frequency at which excessive rates of precipitation occur in different sections of the United States, and the intensity and duration of those rates. Such data are fundamental for the adequate and economical design of farm-terrace systems, farm-drainage systems, highway and railway culverts, municipal storm-sewer systems, and other engineering works that must care for storm run-off."

SOIL STRUCTURE, FERTILITY, AND MOISTURE STUDIES

ANONYMOUS.

(3133)

NEW SOIL SAMPLER FOR DEEP TESTS. Engin. News-Rec. 116: 804-805. June 4, 1936.

Drawings illustrate an improved sampler which is a product of the materials and research department of the California Division of Highways. It requires no casing for deep foundation tests; retractable plug in end of tube permits driving to desired depth; greatly decreases cost and time of sampling.

(3134)

SOIL BUILDING IN EVERYDAY TERMS. Amer. Agr. 133: 5, 9. May 23, 1936.

Suggestions are given for the new and easy way to spread lime or super-phosphate on spring grain or pasture that is not too hilly. A practical procedure for mulching apple orchards, and windbreak construction on muck or sandy soils for erosion control are outlined.

ADAMS, J. E., ROLLER, E. M., AND BOGGS, H. M.

(3135)

A GREEN MANURE FERTILIZER STUDY ON NORFOLK SAND. Soil Sci. 42: 175-185, illus. September 1936.

The authors give results obtained at the South Carolina Agricultural Branch Experiment Station from a comparison made of legume stubble with the full crops of the legumes turned under as green manures, when used in rotation with corn and cotton. "Yields were influenced more by the nitrogen of the fertilizer than by the management of the legumes. The winter cover was apparently more effective in influencing yields than was the legume green manure or legume stubble."

ALEXANDER, A. E.

(3136)

PETROLOGY OF THE GREAT DUSTFALL OF NOV. 13, 1933. U. S. Monthly Weather Rev., 62: 15. January 1934.

"Snow falling at Buffalo . . . was discovered to be discolored." The top few inches of fresh snow were collected and melted, then examined through a microscope. The organic and inorganic substances present are listed.

ALICANTE, M. M.

(3137)

IMPORTANCE OF SOIL SURVEYS IN THE PHILIPPINES. *Sugar News* 17: 323-324. August 1936.

The author describes some of the most important considerations regarding the value of soil surveys in the Philippines. The methods employed in making an inventory of the soil resources in the Islands are also fully described.

ALWAY, F. J.

(3138)

CHANGES IN THE COMPOSITION OF THE LOESS SOILS OF NEBRASKA CAUSED BY CULTIVATION. *Nebr. Agr. Expt. Sta. Bull.* 111 (v. 22), 19 pp. 1909.

"To what extent has the fertility of the soil of Nebraska been depleted and what will be the result of the continuance of the present methods of farming? It is as a preliminary answer to this question that the present bulletin is published. The analyses reported indicate wherein the chief changes in composition have taken place during the past thirty to fifty years of cultivation and also wherein the most rapid changes of the future are to be expected." The methods of sampling and of analysis are described, and results given in tables.

—AND NELLER, JOSEPH R.

(3139)

A FIELD STUDY OF THE INFLUENCE OF ORGANIC MATTER UPON THE WATER-HOLDING CAPACITY OF A SILT-LOAM SOIL. *Jour. Agr. Research* 16: 263-278. 1919.

This paper reports a detailed study of moisture conditions found on two adjoining plots at the Minnesota Agricultural Experiment Station, both of which had a silt loam soil, uniform in texture, but differing widely in content of organic matter as a result of differences in cultural treatment.

ANTHONY, R. D.

(3140)

MAKING THE MOST OF RAINFALL IN THE ORCHARD. *Hoosier Hort.* 16: 76-78. May 1934.

Studies in soil erosion in the corn and wheat area of Missouri, and soil-moisture studies at the State College experiment orchard in Pennsylvania are described. The writer summarizes the data obtained from these studies.

BAILEY, L. H.

(3141)

THE PROBLEM OF IMPOVERISHED LANDS. N. Y. (Cornell) *Agr. Expt. Sta. Bull.* 174, pp. 91-122, illus. 1899.

The author stresses the need for restoration of land to its original producing power. This bulletin gives several reasons why lands become impoverished, e. g., too high acid content, lack of useful plant food, insufficient tillage, and improper drainage.

BARBOUR, G. B.

(3142)

LOESS OF CHINA. *Smithsn. Inst. Ann. Rept.* (Pub. 2879) 1926: 279-296, illus. 1926.

"The true Chinese loess is a yellow-gray poorly consolidated loam deposit of the fineness of silt, which shows a characteristic absence of horizontal layer structure, being essentially nonstratified, and a tendency to split along roughly vertical joint planes, so as to form perpendicular cliffs and walls." The chemical analysis of various loess soils is given as well as the mineralogical and mechanical analysis. The soil characteristics of loess are described and compared with the loess of Europe and the United States. The origin and mode of accumulation of loess are discussed.

BARNETTE, R. M., AND HESTER, J. B.

(3143)

EFFECT OF BURNING UPON THE ACCUMULATION OF ORGANIC MATTER IN FOREST SOILS. *Soil Sci.* 29: 281-285, illus. March 1930.

"The possible utilization of thousands of acres of the poorer sand lands in the southeastern coastal plains has focussed attention on reforestation and the possible revenues to be obtained by following a system of logical and protected reforestation. One of the greatest problems in the utilization of these poorer lands has been the burning of forests and cut-over lands." Experiments made and their results are described.

BARTHOLOMEW, R. P.

(3144)

VARIATIONS IN MOISTURE AND NITRATE CONTENT OF FIELD SOILS RECEIVING DIFFERENT METHODS OF CULTIVATION. Ark. Expt. Sta. Bull. 270, 24 pp. 1932.

This bulletin contains a report of work done since 1925 to determine the effects of different methods of cultivation upon the nitrate and moisture content of soils. Methods of cultivation selected were those which could be adapted for actual use on farms. In his conclusion the author says: "The nitrate and moisture content of the soils are greatly lowered, when weeds are permitted to grow, by utilization of these compounds by the weeds. Cover crops prevented loss of large quantities of available nitrogen and in addition added considerable active organic matter to the soil when plowed under in the spring."

BATJER, L. P.

(3145)

SOME SUGGESTIONS FOR SOIL MANAGEMENT IN WEST VIRGINIA. Mountaineer Grower 8: 1-9. May 1937.

In an address delivered before the West Virginia Horticultural Society's forty-fourth convention, Martinsburg, February 11, 1937, the author discussed some of the aspects of soil management and fertilization in the established orchard, and the relation of these factors to moisture conservation and the nutrition of the tree.

BAVER, L. D.

(3146)

SOME SOIL FACTORS AFFECTING EROSION. Agr. Engin. 14: 51-52, illus. February 1933.

Physical soil factors affecting erosion are considered under the classification of meteorological, environmental, and inherent.

BENNETT, H. H.

(3147)

CHARACTER AND SIGNIFICANCE OF THE SOILS OF CUBA. Assoc. de Tecnicos Azucareros de Cuba, Proc. Ann. Conf. 5: 7-14. December 1931.

"The author of this paper has seen in no other part of the Western Hemisphere greater soil variety, considering the area, than that characterizing the lands of Cuba, nor any other region where good agricultural practice is more acutely dependent on recognition of the cultural significance of these variables, especially with respect to sugar cane." Certain soils peculiar to Cuba are discussed, and the need for erosion-control measures in certain parts of Cuba is pointed out.

CULTURAL CHANGES IN SOILS FROM THE STANDPOINT OF EROSION. Jour. Amer. Soc. Agron. 23: 434-454. June 1931.

The terms "the soil" and "cultural changes", as used in this article, are clearly defined. Abnormal or unnatural erosion is the object of discussion. Experiments for the measurement of soil loss made in Texas, Missouri, southern Iowa, southeastern Nebraska, northeastern Kansas, and the Piedmont, are described, as are also soil changes in the Black Belt of Alabama, Mississippi, and Texas. The texture of the topsoil, losses of organic matter, and other constituents are discussed, with tables of chemical and mechanical analyses of eroded and uneroded soils. "Soil erosion is a scientific problem, as well as a business problem, that must be attended to now", the author maintains.

THE SOILS AND AGRICULTURE OF THE SOUTHERN STATES. 399 pp., illus. New York, Macmillan Co. 1921.

In his preface and introduction the author says: "Making better use of the soils by using them more in accordance with their adaptations and requirements . . . is a means of improving agricultural efficiency which this volume attempts to emphasize and undertakes to encourage . . . It is the purpose of this volume to describe the important agricultural lands of the Southern States; to tell, in so far as space and the information at hand permit, what the soils are, where they occur, what crops they are used for, what crops they may be used for, what methods of soil treatment are employed on them, and what methods are essential to their most efficient use." A list of publications on soils, soil physics, soil chemistry, soil management, crops, livestock, etc., is given, pages 354-360.

BENNETT, H. H.

(3150)

SOILS OF THE LIMESTONE VALLEYS AND UPLAND PROVINCE. U. S. Dept. Agr. Bull. 96: 85-108. 1913.

The physiography and geology of the limestone valleys and the limestone uplands are considered. The drainage, climate, soils, and agriculture are described. A key as to the use of soils of this area is presented in tabular form.

(3151)

SOIL TYPES AND HOW THEY MAY BE RECOGNIZED. U. S. Dept. Agr. Yearbook 1926: 667-671, illus. 1927.

The value of soil-survey reports and soil maps now being published by the Department of Agriculture is stressed. Land could be saved from erosion if the owners understood its strong tendency to erode and protected the slopes with terraces. The farmer must get acquainted with the soil types of his farm.

(3152)

SOME COMPARISONS OF THE PROPERTIES OF HUMID-TROPICAL AND HUMID-TEMPERATE AMERICAN SOILS WITH SPECIAL REFERENCE TO INDICATED RELATIONS BETWEEN CHEMICAL COMPOSITION AND PHYSICAL PROPERTIES. Soil Sci. 21: 349-375. May 1926.

"This paper correlates the friability and plasticity of certain heavy clay soils as determined by field methods with the

$$\frac{\text{SiO}_2}{\text{Al}_2\text{O}_3 + \text{Fe}_2\text{O}_3}$$

ratio of the same soils obtained by chemical analyses made in the laboratories of the bureau of soils. The analytical results cited show the composition of the whole soil and not that of the colloidal constituent alone, but since these soils are very heavy and undoubtedly high in colloidal content, it is believed that the results may be accepted for the purposes of this paper as essentially equivalent to the results that would be obtained by separating and analyzing the contained colloids."

— AND ALLISON, R. V.

(3153)

THE SOILS OF CUBA. 410 pp., illus. Baltimore, Monumental Printing Co. 1928.

"This work is the outcome of cooperation between the Tropical Plant Research Foundation and the Bureau of Soils of the United States Department of Agriculture, undertaken, on the part of the Foundation, to secure information for its guidance in locating experimental fields and in planning and conducting investigations on the production of sugar cane, and on the part of the Bureau of Soils, for the purpose of extending its knowledge of the soils of the tropics."—W. A. Orton. Partial table of contents: General Soil Characteristics; Soil Series Descriptions; Middle Cuba; Eastern Cuba; Western Cuba; Isle of Pines; Salt in Cuban Soils; Soil Moisture Studies; Climate; and The Relation of Soils to Agriculture in Cuba.

BODMAN, G. B.

(3154)

FACTORS AFFECTING DOWNWARD MOVEMENT OF WATER IN SOILS. Amer. Soil Survey Assoc. Bull. 17: 33-38, illus. 1936.

Literature references, page 38.

BOUYOUCOS, G. J.

(3155)

THE CLAY RATIO AS A CRITERION OF SUSCEPTIBILITY OF SOIL TO EROSION. Jour. Amer. Soc. Agron. 27: 738-741. September 1935.

In studying slaking, ultimate structure of soils, the relative dispersibility of soils, and in a mechanical analysis of the aggregate structure of soils the writer was convinced "that probably the major and fundamental principle governing and underlying the relative erosiveness of soils is the relation between the content of total sand plus silt and the total clay content."

BRACKEN, A. F., AND CARDON, P. V.

(3156)

RELATION OF PRECIPITATION TO MOISTURE STORAGE AND CROP YIELD. Jour. Amer. Soc. Agron. 27: 8-20. January 1935.

The author points out the importance of profitable utilization of western dry-farm land under the cropping system of alternate wheat and fallow.

"The particular phase of the problem dealt with in this study is that of measuring the percentage of rainfall saved in the soil over a whole period of a fallow-crop cycle and fraction of a cycle as related to water cost of crop production." Environmental factors, methods, and results are given in tables. Literature is cited.

BRADFIELD, RICHARD.

(3157)

SOIL CONSERVATION FROM THE VIEWPOINT OF SOIL PHYSICS. Jour. Amer. Soc. Agron. 29: 85-92. February 1937.

Discusses soil conditions during the colonization period and compares them with our modern period of accelerated erosion. Factors responsible for the change are summarized. Some physical aspects of soil structure and its relation to absorption are considered. Presented at annual meeting, American Society of Agronomy, Washington, D. C., November 19, 1936, as part of a symposium on the scientific aspects of soil conservation.

BRAND, C. J.

(3158)

CONSERVATION OF OUR SOIL AND FERTILIZER RESOURCES. Amer. Fert. 80: 5-7, 26. April 21, 1934.

Discusses soil losses from erosion throughout the United States and the effects of erosion on soil fertility. Fertilizer resources and prices are considered.

BRIGGS, L. J.

(3159)

MOVEMENT AND RETENTION OF WATER IN SOILS. U. S. Dept. Agr. Yearbook 1898: 399-404, illus. 1899.

Surface tension of water, capillary movement of water, and the influence of texture of soils upon movement of water are discussed and illustrated.

BROWN, IRVIN C., AND BYERS, HORACE G.

(3160)

THE CHEMICAL AND PHYSICAL PROPERTIES OF DRY-LAND SOILS AND OF THEIR COLLOIDS. U. S. Dept. Agr. Tech. Bull. 502, 56 pp., illus. 1935.

This bulletin presents data on the mechanical and chemical composition of 13 soil profiles. A field description is given of each soil series.

——, RICE, T. D., AND BYERS, HORACE G.

(3161)

STUDY OF CLAYPAN SOILS. U. S. Dept. Agr. Tech. Bull. 399, 42 pp. 1933.

This investigation of chemical and physical properties of groups of soils was undertaken as a continuing study of the relation between the chemical characteristics of soils and their classification. "It was also expected that light might be thrown on the processes of production of claypan. It was at first intended to limit the study to the claypan soils of Nebraska, but as the work developed it seemed wise to include three profiles from other sources."

BROWN, P. E.

(3162)

THE MYSTERY OF THE SOIL. Jour. Amer. Soc. Agron. 24: 935-950. December 1932.

The author presents the philosophic and religious relations of primitive man to the soil, showing how the inquiring and investigational nature of man gradually developed to present-day scientific soil research. This address covers various qualities of soil, legume, bacteria, acids, and fertilizers; the physical, chemical, and biological forces at work together with the complex problems of organic matter, crop rotation, drainage, irrigation, and cultivation. "One of the most interesting observations to be made at the present time, as Soil Science develops and as Crop Science develops, is that these two sciences are not growing apart, but they are coming to depend more and more upon each other."

BUCKINGHAM, EDGAR.

(3163)

STUDIES ON THE MOVEMENT OF SOIL MOISTURE. U. S. Bur. Soils Bull. 38, 61 pp., illus. 1907.

"The movement of the water in the soil, whether by the capillary forces exerted in the finer soil spaces at soil surfaces, or by distillation from one point to another, has long been regarded as a very important phenomenon and has often been investigated . . . In the present bulletin it is shown that the loss of water by evaporation from points below the surface . . . is nevertheless quite small, and is negligible in comparison with the losses taking place at or very near the surface . . ." The drying

of soils under arid and humid conditions is discussed, and the capillary action in soils is treated at length under four headings: (1) Nature of the problem; (2) the capillary potential; (3) the capillary conductivity; and (4) the capillary flow of water.

BUE, T. S. (3164)

RELATION OF SOIL AND WATER CONSERVATION TO THE FERTILIZER INDUSTRY. Amer. Fert. 87: 7-9, 24, 26. July 24, 1937.

An address given at the convention of the National Fertilizer Association, White Sulphur Springs, W. Va., on June 8, 1937. Gives estimates on plant-food losses from leaching, erosion, and grazing in the United States and shows the importance of fertilizer in the soil conservation program. The use of fertilizers in erosion control is discussed.

BURR, W. A. (3165)

POWER OF SOILS TO RESIST EROSION BY WATER. Irrig. Age 8: 235-236, illus. December 1895.

Classification of soils with a table showing resistance of soils to erosion.

BURR, W. W. (3166)

THE STORAGE AND USE OF SOIL MOISTURE. Nebr. Agr. Expt. Sta. Bull. 140, v. 26, 20 pp. 1914.

"In this paper we have attempted to sum up the main facts indicated by the study that has been carried on at The North Platte Substation for a number of years relative to the storage and use of soil moisture. The entire discussion is based upon results of work which has been done in the field, exposed to the same climatic conditions to which all fields in that immediate locality are exposed . . . Accurate climatic records have been kept so as to properly interpret the results."

(3167)

STORING MOISTURE IN THE SOIL. Nebr. Agr. Expt. Sta. Bull. 114, 52 pp., illus. 1910.

Methods for the best use of precipitation for development of the tablelands in western Nebraska are discussed. "We show conclusively that moisture can be stored by summer tillage and that surface evaporation is checked by all thoro cultivation; that the amount of moisture which can be held in this way is sufficient to assist very greatly during a dry season or during a short period of drouth."

CALIFORNIA AGRICULTURAL EXPERIMENT STATION. (3168)

SOIL TECHNOLOGY. Calif. Agr. Sta. Rept. 1930: 94-96. 1930.

Investigations made in the cooperative soil survey of California are described and the findings presented. Measurements on subsidence of peat lands in the Sacramento-San Joaquin delta, soil-temperature studies, and the value of paper mulches as a soil cover are discussed.

CALL, L. E. (3169)

SOIL FERTILITY INVESTIGATIONS. Kans. Agr. Expt. Sta. Bien. Rept. 6: 25-26. 1932.

A brief report of studies on the yields of wheat, oats, and corn, the effect of alfalfa on the protein content of wheat, fertilizers, terracing, run-off, and erosion.

CAMERON, F. K., AND GALLAGHER, F. E. (3170)

MOISTURE CONTENT AND PHYSICAL CONDITION OF SOILS. U. S. Bur. Soils Bull. 50, 70 pp., illus. 1908.

The authors give the results of an investigation on the relation of physical condition of soil to moisture content. Soils of different chemical properties and with varying amounts of water present were subjected to various chemical tests yielding measurable results.

CARTER, W. T. (3171)

THE SOILS OF TEXAS. Tex. Agr. Expt. Sta. Bull. 431, 192 pp., illus. 1931.

This bulletin describes soils and soil types, agricultural practices and soil utilization, surface, relief, climate, and natural vegetation in the entire State. Considerable data are given on erosion and control practices in the different areas.

CASAGRANDE, ARTHUR.

(3172)

CHARACTERISTICS OF COHESIONLESS SOILS AFFECTING THE STABILITY OF SLOPES AND EARTH FILLS. Jour. Boston Soc. Civ. Engin. 23: 13-32, illus. January 1936.

"It is not an exaggeration to state that throughout history and into the present day faulty designs have caused more loss of life and property in the field of earth and foundation engineering than in any other branch of engineering. In this field the largest share of these have been caused by failures of dams and dykes." The author defines the meaning of the term "stability" and those volume changes associated with the deformation of soils affecting stability.

CHILCOTT, E. C.

(3173)

THE RELATIONS BETWEEN CROP YIELDS AND PRECIPITATION IN THE GREAT PLAINS AREA. U. S. Dept. Agr. Misc. Circ. 81, 94 pp., illus. 1927.

Presents data on the relation of crop yields to precipitation and gives the findings of 23 experimental stations in the western part of the United States. Comparisons are made between the data furnished by the different stations.

COBB, WILLIAM BATTLE.

(3174)

VARIATIONS IN SOILS DEVELOPED FROM SANDS IN EASTERN NORTH CAROLINA. Elisha Mitchell Sci. Soc. Jour. 47: 17-18. January 1932.

A description of the differences in soils of the coastal plain of North Carolina.

COILE, T. S.

(3175)

SOIL SAMPLERS. Soil Sci. 42: 139. August 1936.

Describes two types of cylinders devised and used with success in studying some of the physical properties of soils, with particular reference to those influencing the movement and availability of water, when it is desirable to obtain soil samples, the natural structure of which is undisturbed.

CONGER, CARL C.

(3176)

STORED MOISTURE DETERMINES YIELD. Kans. Farmer 74: 10, illus. September 12, 1936.

Stafford County farmers demonstrate that the depth of soil moisture at seeding time has a direct relationship to the yield of wheat.

COOK, R. L.

(3177)

GOOD DRAINAGE IS ESSENTIAL. Mich. Farmer 186: 105. February 15, 1936.

Discusses harm done to soil bacteria by excessive moisture, and value of proper drainage especially on alfalfa and clover lands.

COPELAND, J. T.

(3178)

FIELD OBSERVATION OF SOIL EROSION INDEX VARIANTS. Agr. Engin. 14: 206. August 1933.

"The agricultural practices in Mississippi, together with the climatic conditions, offer a wide range of variables to influence the behavior of a soil, of which there are ten general areas and more than 150 types."

CORNELL, H. H.

(3179)

THE RELATIONSHIP BETWEEN SOIL AND RAIN, WITH REFERENCE TO SOIL EROSION. Farming in So. Africa 10: 210-212. 1935.

Run-off water and its speed are controlled by the following factors: (1) The texture and structure of the soil; (2) physical condition of the soil surface; (3) total amount of rain; (4) nature (distribution) of rain; (5) vegetal cover on the soil; and (6) slope or gradient of the surface. These are discussed separately stressing the importance of the time factor. 1936.

A brief account of Gericke's experiments in producing artificial soil and plant-food solutions.

GROWING CROPS WITHOUT SOIL. Pacific Rural Press 132: 305. September 19,

CURRIE, J. H.

(3180)

DANIEL, H. A.

(3181)

THE PHYSICAL CHANGES IN SOILS OF THE SOUTHERN HIGH PLAINS DUE TO CROPPING AND WIND EROSION AND THE RELATION BETWEEN THE $\frac{\text{SAND} + \text{SILT}}{\text{CLAY}}$ RATIOS IN THESE SOILS. Jour. Amer. Soc. Agron. 28: 570-580, illus. July 1936.

Presents in detail findings of mechanical analyses of a large number of cropped and virgin surface and subsurface soils of the southern high plains and their comparison with the sand, silt, and clay contents of the soil drifts. Shows how the greatest difference between drift material and the cropped and virgin surfaces occurs in the coarse- and medium-textured types. Data indicate little relation between the clay ratio and wind erosion.

DE TURK, E. E.

(3182)

SOIL CONSERVATION FROM THE VIEWPOINT OF SOIL CHEMISTRY. Jour. Amer. Soc. Agron. 29: 93-112, illus. February 1937.

Presented at annual meeting of the American Society of Agronomy, Washington, D. C., November 19, 1936, as part of a symposium on the scientific aspects of soil conservation. An analysis of soil deterioration factors of the humid temperate region, particularly as exemplified by Illinois conditions.

Literature cited, pages 111-112.

EDLEFSEN, N. E., AND COLE, R. C.

(3183)

A COMPARISON OF THE SPECIFIC GRAVITY BALANCE AND THE PIPETTE METHODS OF DETERMINING DENSITY OF SOIL SUSPENSIONS. Soil Sci. 42: 131-137, illus. August 1936.

A series of tests were made on dispersed soil. With the aid of tables the authors show the results obtained.

FERGUS, E. N.

(3184)

SHALL CROPS BE ADAPTED TO SOILS OR SOILS TO CROPS? Jour. Amer. Soc. Agron. 28: 443-446. June 1936.

Discusses the serious consequences of adapting poor-land crops to depleted soils unattended by liming, manuring, and fertilizing. Contains information concerning diseases of mineral malnutrition, in humans and animals, resulting from continuous subsistence upon food grown in impoverished soils.

FINNELL, H. H.

(3185)

HEAVY PLAINS SOIL MOISTURE PROBLEMS. Okla. Agr. Expt. Sta. Bull. 193, 8 pp. 1929.

"The observations and suggestions given in this bulletin apply to the heavy soils of Panhandle Oklahoma and the adjacent region. The soil referred to is commonly known as hard land, tight land, black land, wheat land, clay soil, or heavy soil to distinguish it from the sandy or loam soils also found in this region." Getting moisture into the soil and making use of soil water are discussed and 11 rules for dry farming on heavy soils are given.

(3186)

THE UTILIZATION OF MOISTURE ON HEAVY SOILS OF THE SOUTHERN GREAT PLAINS. Okla. Agr. Expt. Sta. Bull. 190, 24 pp. 1929.

The author points out a number of superficial ideas relating to farm methods in crop production. "It is true that when soil is moist a deep plowing will use more moisture than a crop in the early stages of growth . . . Moderately deep plowing may be used to the advantage of the fertility condition more often than it usually is." Description of soils, climatic features, factors affecting the behavior of soil moisture, and the relation of factors affecting crop yields are among the points covered.

GARDNER, WILLARD.

(3187)

THE ROLE OF THE CAPILLARY POTENTIAL IN THE DYNAMICS OF SOIL MOISTURE. Jour. Agr. Research 53: 57-60. July 1, 1936.

The author presents a formulary discussion of flow of soil moisture.

GLINKA, K. D.

(3188)

THE GREAT SOIL GROUPS OF THE WORLD, THEIR CHARACTERISTICS, DISTRIBUTION, AND PROCESS BY WHICH THEY HAVE BEEN DEVELOPED. Leningrad 1914. Kans. Agr. Expt. Sta. Bull. 273, 46 pp. 1936.

The translator, in his preface, says: "The fact that the soils of our own country are so much like those found in Russia and Siberia makes the results of Russian Soil investigation peculiarly interesting to American investigators." The author states: "In the following work I attempt to sum up all observations which have been made by Russian investigators in the field of soil genesis and the geography of soil types as well as the conclusions they have drawn from them . . . I do not undertake in this work to discuss the fundamental physical or chemical principles involved in soil investigation." On pages 7-31 the subject matter, and aims of pedology are set forth; pages 32-80 deal with soil classification.

HALE, G. A.

(3189)

FERTILIZER TO CONTROL COTTON-BELT EROSION. Better Crops with Plant Food 21: 21-22, 46-47, illus. August-September 1937.

"In the future, commercial fertilizer is destined to assume a new role, that of maintaining present crop yields by increasing vegetal cover for holding topsoil in place and keeping fertility at present and higher levels . . . Its use will be as one of many other good Soil Conservation practices rather than as a substitute for these practices."

HALLSTED, A. L., AND MATHEWS, O. R.

(3190)

SOIL MOISTURE AND WINTER WHEAT WITH SUGGESTIONS ON ABANDONMENT. Kans. Agr. Expt. Sta. Bull. 273, 46 pp. 1936.

"The purpose of this publication is to acquaint farmers with methods of determining at seeding time their chances of obtaining a paying crop and of ascertaining relatively early in the spring whether or not the crop should be abandoned . . . The results presented in this bulletin were obtained at the Kansas branch stations located at Hays, Colby, and Garden City . . . Soil moisture determinations were carried on in connection with the crop rotation and cultural method experiments throughout the period of seedbed preparation and growth of the wheat crop, but only those made at seeding time are considered here."

HARMER, P. M.

(3191)

DENSITY OF THE SURFACE FOOT IN FOREST AND PRAIRIE ON THE LATE WISCONSIN DRIFT. Soil Sci. 23: 73-80. January 1927.

"In connection with a study of the composition of virgin soils developed upon the hill plains of the late Wisconsin glaciation, the density was determined for each of the four 3-inch sections of the surface foot in six woods and in six prairie fields—remnants of the original prairies." The fields, and the method of investigation are described.

HARRIS, J. E.

(3192)

ABSORPTION BY SOILS. Jour. Phys. Chem. 21: 454-473. June 1917.

"The experiments described in this paper have been undertaken to obtain more evidence concerning the phenomena of soil acidity and of absorption by soils." Properties of acid soils together with a review of various theories concerning the cause of acidity are discussed. Treatment of soils with salt solutions is summarized.

HAWKS, EMMA B., AND TROLINGER, CHARLOTTE.

(3193)

LIST OF THE PUBLICATIONS ON SOILS ISSUED BY THE U. S. DEPARTMENT OF AGRICULTURE, 1844-1926. U. S. Dept. Agr. Libr., Bibliog. Contrib. 14, 63 pp. Washington, D. C. May 1927. [Mimeographed.]

HENDRICK, J.

(3194)

SOIL SCIENCE IN THE TWENTIETH CENTURY. Nature [London] 138: 995. December 12, 1936.

This paper reviews the notable features in the Russian philosophy of soils and mentions importance of soil moisture, soil studies of drain gages, soil colloids, and humus.

HENDRICK, J., AND SHELTON, F. A. (3195)

SOIL ORGANIC MATTER INVESTIGATIONS UPON COASTAL PLAIN SOILS. Va. Truck Expt. Sta. Bull. 94: 1397-1428, illus. Norfolk. January 1, 1937.

Discusses nitrogen content; organic matter and phosphorus availability; soil colloid composition and aluminum solubility; soil organic matter and aluminum solubility, base holding power, microbiological activity; cover-crop rotation and potato production; the yield and composition of cover crops; yield and composition of cash crops; and suggested rotations.

HESTER, J. B. (3196)

SOME FUNCTIONS OF SOIL ORGANIC MATTER AND COVER CROPS IN SOIL FERTILITY. Md. State Hort. Soc. Proc. 38: 33-40. 1936.

Maryland soils form the basis of this discussion.

HEYWARD, FRANK (3197)

SOIL SAMPLING TUBES FOR SHALLOW DEPTHS. Soil Sci. 41: 357-360, illus. May 1936.

Three different types of soil sampling tubes and their construction are described: (1) A tube for collecting samples for moisture determination of the 0- to 7-inch soil depth; (2) tube for collecting a large number of cores in undisturbed field condition from the 0- to 6-inch soil depth of a size large enough to grow tree seedlings; and (3) tube for obtaining a large number of samples of constant volume from the 0- to 3-inch soil depth.

HILGARD, E. W., AND LOUGHRIDGE, R. H. (3198)

THE CONSERVATION OF SOIL MOISTURE AND ECONOMY IN THE USE OF IRRIGATION WATER. Calif. Agr. Expt. Sta. Bull. 121: 3-12, illus. 1898.

The exceptionally dry season of 1897-98 was the reason for making experimental studies for "the limits of endurance of drought on the part of several crop plants, and . . . to determine the minimum of water that will suffice for their satisfactory growth in the several soils." Results are given as to the amount of water required by crops and the probable causes of the endurance of drought. The utilization of winter rains and winter irrigation, a knowledge of the subsoil, the employment of proper means to prevent evaporation are advocated for the necessary conservation of soil moisture.

HOEGEMEYER, L. C. (3199)

THE IMPORTANCE OF SOIL CONSERVATION. Jour. Amer. Soc. Agron. 28: 1037-1038. 1936.

"The maintenance of soil fertility depends upon the control of erosion, the amount removed by crops, and the amount of leaching and volatilization. The control of these depleting forces is also essential for the conservation of the soil."

HOGENSON, J. C. (3200)

CONSERVING OUR SOIL RESOURCES. Utah Farmer 56: 6,15. February 10, 1936.

The author discusses important factors of soil fertility, texture of soil, conservation of moisture, organic matter and humus, soluble plant foods and salts, soil ventilation, soil temperature, and bacteria in soil.

HOPKINS, E. S. (3201)

SOIL MOISTURE INVESTIGATIONS IN CANADA. Sci. Agr. 5: 79-83. November 1924.

Results of experiments conducted in deep tanks at the Dominion experimental farms in Canada to learn what crops would prove the most satisfactory and what rotations and cultural methods for combating droughts would give best results. "In order to make conditions in the tanks resemble field conditions insofar as wind and light are concerned a small area around each tank is seeded with the same crop as used in the tank."

HOSKING, J. EVERARD. (3202)

MAINTAINING ENGLISH SOILS IN "GOOD HEART." Soil Conserv. 3: 5-8, 13, 28, illus. July 1937.

"With proper allowance for the differences between the English and the American types of agriculture, Mr. Hosking's article is arresting and stimulative in the emphasis it throws on certain more or less neglected aspects of soil husbandry . . . A recent report of the Missouri Agricultural

Experiment Station, Bulletin 369, refers to the production of manure artificially in England, and makes interesting reading in connection with Mr. Hosking's contribution."—Editor.

- HOWARD, A., AND HOWARD, G. L. C. (3203)
NOTE ON DRAINAGE AND GREEN MANURING. *Agr. Jour. India* 9: 197-204.
April 1914.

Experiments in growing crops in the botanical area at Pusa, Bihar (India), demonstrated that "the first condition of progress in any scheme of improvement in the crop-producing power of the soils of Bihar is a system of surface drainage by which each field deals with its own rainfall only. In this way all lands are benefited. On high lands green manuring . . . can be carried out with safety while the cultivation of crop-producing power of lower lands are materially increased. The Pusa system of drainage also prevents the denudation of the soil by rain-wash and the loss of fine particles which are now carried away every year from the high to the low-lying areas. The cost of this system is small . . ." Experiments with green manure for tobacco growing and results are described in detail.

- HUTCHESON, T. B. (3204)
PLANT FOOD NEEDS OF SOIL-CONSERVING CROPS. *Fert. Rev.* 12: 6-7, illus. July-August 1937.

The author is of the opinion that much of the erosion commonly attributed to tillage is due to poor land, and is "quite certain that little progress will be made in establishing ground cover on erosive soil until we realize that soil-conserving crops, like all other crops, must have plant food."

- HUTCHINSON, W. L. (3205)
SOILS OF MISSISSIPPI. *Miss. Agr. Expt. Sta. Bull.* 132. 8 pp., illus. 1910.

Soil management is discussed with reference to drainage, good tillage, soil washing on uplands, humus, and neat farming. "Mississippi farmers have grown up with the idea that cultivated land must needs wear out and be abandoned for nature to again make it fit for cultivation . . . Properly managed, soil may be cultivated forever and be better at the end than it was in the beginning." Terraces and sod for uplands that suffer from erosion are advocated.

- INTERNATIONAL CONGRESS OF SOIL SCIENCE. (3206)
PROCEEDINGS AND PAPERS OF THE FIRST INTERNATIONAL CONGRESS OF SOIL SCIENCE, WASHINGTON, D. C., JUNE 13-22, 1927. V. 3, 4, and 5, illus. 1928.

Volume 3 contains papers on soil biology, biochemistry, and soil fertility. "Microbiological Aspects of Green Manuring", by J. G. Lipman and A. W. Blair, pp. 312-316, presents data on the effects of green manuring on corn, soil conservation being considered in the experiments.

Volumes 4 and 5 contain miscellaneous papers. Those related to the study of soil conservation are: A Scheme for Soil Classification, by C. F. Marbut; A Uniform International System of Soil Nomenclature; A Definition of Terms Used in Soil Literature; and The Basis of Classification and Key to the Soils of California, by C. F. Shaw; The Classification of Organic Soils, by J. O. Veatch; The Important Types of Cuban Soil Profiles, by H. H. Bennett; The Use of Soil Surveys in Forestry, by J. Kittredge, Jr.; The Special Problems of Forest Soils, by C. G. Bates; Silviculture as a Factor in Maintaining the Fertility of Forest Soils, by R. Zon.

- (3207)
PROCEEDINGS AND PAPERS OF THE SECOND INTERNATIONAL CONGRESS OF SOIL SCIENCE LENINGRAD-MOSCOW, U. S. S. R. JULY 20-21, 1930. V. 1, 5, and 6. 1932.

Volume 1 contains the papers of commission 1 (soil physics). On pp. 71-75 the question of water-holding capacity of soils in relation to its structure and drying is discussed by A. I. Apromelko.

Papers in Volume 5 which have a bearing on soil erosion and related subjects are: The Asymmetry of the Erosion and Sculptural Forms of the Relief of the Plains of the Moderate Belt, by R. S. Ilyin; Relation of Soil Type to the Environment, by C. F. Marbut; A Soil Formation Formula, by C. F. Shaw; Geobotany and Ecology of Plants in Connection With Soil Science, by B. A. Keller; Organization of Soil Scientific Zone Stations on an

in Crop Pra Scale, by J. N. Afanassiev; Leached Soils of Desert Regions, duction; Law; Decomposition of the Foliage of Trees and Bushes, by N. N. drainage; The removal of Soluble Salts from Virgin Black Alkali Soils, by main; s; American Alkali Soils with Special Reference to Mode of Theq on and Methods of Reclamation, by W. P. Kelley.

prevent al contents of Volume 6: Deluvial Soil Processes as a Secret Plague Soil Cultivation and Atmospheric Precipitation, by J. Zölinski, pp. 203-207; Method of Determining the Permeability of Soils (According to the Method of Kopecky), by D. S. Hissink and S. B. Hooghout, pp. 38-40; Absorption Capacity and Humidity of Soils, by V. G. Korner, pp. 96-98; A General Scheme of Soil Researches Necessary in Establishing a Basis For Land Reclamation Projects, by L. P. Rozov, pp. 168-174.

ISRAELSEN, O. W., AND WEST, F. L. (3208)

WATER-HOLDING CAPACITY OF IRRIGATED SOILS. Utah Agr. Expt. Sta. Bull. 183, 24 pp., illus. 1922.

The experiments reported were planned to measure the capacity of some soils to retain water, whereby the irrigator could determine the proper amount of water to apply to such soils in a single irrigation. There is also a summary of field and laboratory water-capacity tests made in various Western States.

JACOT, A. P. (3209)

SOIL POPULATIONS. Sci. Monthly 42: 247-251. March 1936.

Describes soil channeling and tree ramifying by microarthropods, minute ants, and earthworms, as related to soil structure, fertility, and rain-water percolation. When these minute soil animals are removed by intensive erosion they must become reestablished for the maintenance of tilth and fertility.

JEFFERY, J. A. (3210)

SOIL MOISTURE. ITS IMPORTANCE AND MANAGEMENT. Mich. Agr. Expt. Sta. Bull. 219, pp. 31-40, illus. September 1904.

"To discuss the management of soils so that they shall hold the most nearly proper amounts of moisture for crop production and at the same time retain these amounts as far as possible from unnecessary losses is the object of this bulletin." After indicating what may be done to give to the soil its maximum capacity for capillary water, the writer goes on to consider certain methods of moisture management.

JENNY, HANS. (3211)

NITROGEN CONTENT OF SOIL AS RELATED TO PRECIPITATION-EVAPORATION RATIO. Soil Sci. 29: 193-206, illus. March 1930.

"The presentation of several soil nitrogen-moisture curves is the main object of this paper . . . In the present study 628 nitrogen analyses (6 to 8 inches of surface soil) were correlated with N. S. Quotients. The values used were drawn from three sources." A map shows the location of the counties from which soil-nitrogen analyses were obtained.

JOFFE, JACOB S. (3212)

PEDOLOGY (WITH AN INTRODUCTION BY THE LATE C. F. MARBUT). 575 pp., illus. New Brunswick, N. J., Rutgers Univ. Press. 1936.

Divided into two parts. Part 1 deals with soil genetics, discussing soil morphology and soil-forming processes. Part 2 deals with various soil profiles and types of soil formation. The effects of forestation on flood control and erosion are discussed, pages 105-106.

JOSEPH, A. F. (3213)

NOTE ON EROSION AND SOIL ALKALI. REPORT OF CONFERENCE ON COTTON GROWING PROBLEMS. Empire Cotton Growing Corp. [London.] pp. 144-146. [Discussion, pp. 46-52.] 1930.

Soil erosion and soil alkali have in common one thing of great importance, that is "the significance of the composition of the soil, and particularly of the chemical composition of the soil in its relation to important practical properties such as are involved in alkali and erosion studies." Experimental studies of soil erosion in the United States, Ceylon, and South Africa are discussed.

KACHINSKY, N. A.

of manure arti-
THE INFLUENCE OF THE FORM AND SIZE OF IRRIGATED SQUARES ON with Mr.
ABILITY OF THE SOIL. *Pedology* 1: 62-77. 1936.

"Solonchak and solonchaks soils were used for these experiments." (3203)
ability for a given soil tended to increase with the decrease in size 197-204.
irrigated square."

KANSAS AGRICULTURAL EXPERIMENT STATION.

(3215)

SOIL EROSION AND MOISTURE CONSERVATION INVESTIGATIONS. *Kans. Agr. Expt.*
Sta. Bien. Rept. (1930-32) 6: 119-120. 1932.

A brief discussion of a cooperative study conducted by the United States
Bureaus of Agricultural Engineering and Chemistry and Soils at the
Kansas Agricultural Experiment Station.

KARRAKER, P. E.

(3216)

THE EFFECT OF CERTAIN MANAGEMENT PRACTICES ON THE AMOUNT OF NITROGEN
IN A SOIL. *Jour. Amer. Soc. Agron.* 28: 292-296. April 1936.

"From 1923 to 1933, small plots were handled in duplicate as follows on
the Experiment Station farm at Lexington: (1) kept bare by scraping, (2)
in continuous bluegrass, and (3) in continuous bluegrass and white clover.
Sweet clover grew in the bluegrass-white clover plots in the first half of
1925 and an appreciable part of the vegetation in the bluegrass plots dur-
ing the latter years of the experiment was volunteer non-legume plants.
Vegetation was vigorous on the bluegrass-white clover plots during the
experiment, but poor on the bluegrass plots after the first few years of the
experiment. Vegetation was removed from the plots at certain times
through 1928. Thereafter, the plots were clipped several times a year and
the clippings left on the plots. Nitrogen was determined in the 0 to 6 and
6 to 18 inch soil layers of the plots at the beginning of the experiment and
again in 1931."—Summary.

KELLOGG, C. L.

(3217)

DEVELOPMENT AND SIGNIFICANCE OF THE GREAT SOIL GROUPS OF THE UNITED
STATES. U. S. Dept. Agr. Misc. Pub. 229, 40 pp., illus. 1936.

The nature of soils and the environmental factors responsible for their
genesis are discussed. "The practical implications of a knowledge of the
great soil regions and their relationship to the biological complex, and
consequently to human institutions, are pointed out."

(3218)

SOIL GENESIS IN RELATION TO THE SOIL EROSION PROBLEM. U. S. Bur. Chem.
and Soils, 12 pp. 1936. [Mimeographed.]

A lecture given at the University of Wisconsin April 8, 1936. The author
discusses the nature of soils, their formation, and the influence of climate.
Soil-building processes are considered, and soil technique is divided into
two general classifications (1) changing the soil, and (2) choosing plants to
fit the soil.

KING, F. H.

(3219)

INVESTIGATIONS RELATING TO SOIL MOISTURE. *Wis. Agr. Expt. Sta. Rept.*
1891: 100-134, illus. 1891.

"The following subjects are included: (1) Influence of spring plowing in
checking the evaporation of soil water; (2) Early tillage to prevent forma-
tion of clods; (3) Rise of water in natural field soil from below a depth of
5 feet; (4) Influence of surface tillage upon the rate of evaporation; (5)
Influence of farmyard manure on the movement and amount of water in
the soil; (6) manured and unmanured corn ground; (7) Influence of fallow-
ing ground on the water content of the soil; (8) The amount of water
required to produce a pound of barley, oats, and corn in Wisconsin; and (9)
the vertical extent of root-feeding."—*Expt. Sta. Rec.* 4: 122. 1892-93.

(3220)

SOIL MANAGEMENT. 311 pp., illus. New York and London, Orange-Judd Co.
1914.

The author presents a study of soil management in Chosen, China, Japan,
and the United States. Among the subjects treated are: Soil Moisture and
Plant Feeding; Functions, Availability and Conservation of Soil Moisture

in Crop Production; Conservation and Application of Water in Crop Production; and Reclamation of Swamp Lands. "Complete and rapid under-drainage is one of the prime essentials to both the development and the maintenance of the highest productive capacity of any field or soil . . ." The use of reservoirs, canals, and ridge planting are recommended for preventing soil washing.

KOSTIAKOV, A. N.

(3221)

ON THE DYNAMICS OF THE COEFFICIENT OF WATER PERCOLATION IN SOILS, AND ON THE NECESSITY OF STUDYING IT FROM A DYNAMIC POINT OF VIEW FOR THE PURPOSE OF AMELIORATION. Internatl. Soc. Soil Sci. (Trans.) Conn. 6, v. A (Russian part): 17-21, illus. 1932.

"In the domain of melioration and hydrology one had constantly to deal with phenomena of the water absorption by soils, and to base a great many important calculations and deductions in this domain on these phenomena. The basis laid for these calculations is generally the coefficient of filtration of corresponding soils, after Darcy, i. e., one characterizing the rate of water-filtration under conditions of a soil saturated with water. However, a very vast domain of melioration and hydrological problems—such as norms and methods of irrigation, losses of water in channels, phenomena of the water-drainage, and so on—cannot be based on filtration phenomena, as we have to deal with water percolating into soils unsaturated with water, and not into saturated soils."

LIPMAN, J. G.

(3222)

A QUARTER CENTURY PROGRESS IN SOIL SCIENCE. Jour. Amer. Soc. Agron. 25: 9-25. January 1933.

History and development of soil science under the American Society of Agronomy since its establishment in 1907. It contains frequent quotations from American writers on this subject and mentions some European surveys and maps notably those in the Union of Soviet Socialist Republics. Estimates on expenditures for Federal research in soil science are given for the years 1929-31.

LOWDERMILK, W. C.

(3223)

WATER INTAKE OF SATURATED SOILS. U. S. Soil Conserv. Serv. 18 pp. Washington, D. C. 1937. [Mimeographed.]

This paper, presented at the American Geophysical Union, April 29, 1937, Washington, D. C., contains a discussion on two types of Cecil soil series profiles—leached and unleached.

LUTZ, J. F.

(3224)

THE PHYSICO-CHEMICAL PROPERTIES OF SOILS AFFECTING SOIL EROSION. Mo. Agr. Expt. Sta. Research Bull. 212, 45 pp., illus. 1934.

A discussion of studies conducted on Iredell, Davidson, and Putnam soils at the Missouri Agricultural Experiment Station.

(3225)

RELATION OF SOIL EROSION TO CERTAIN INHERENT SOIL PROPERTIES. Soil Sci. 40: 439-457, illus. December 1935.

"It is the object of this paper to present the results of a laboratory study of the physical and chemical properties of several soils that are known to vary in their erosiveness, and to show that certain of these properties play an important role in determining the susceptibility of a soil to erosion." The Iredell sandy clay loam and the Davidson clay were selected, as well as Bentonite and Putnam.

LYON, T. L., AND BUCKMAN, H. O.

(3226)

THE NATURE AND PROPERTIES OF SOILS; A COLLEGE TEXT OF EDAPHOLOGY. Ed. 3, 302 pp., illus. New York, The MacMillan Co. 1937.

Soils are grouped on the basis of a scheme worked out by Glinka and other Russian workers, and adapted to this country by Marbut. Other inclusions are the newer concepts of ionic alkalinity, trace elements as fertilizers, artificial farm manure, and rapid tests for determining available nutrients in soils.

- LYON, T. L., FIPPIN, E. O., AND BUCKMAN, H. O. (3227)
SOILS, THEIR PROPERTIES AND MANAGEMENT. 764 pp., illus. New York, Macmillan Co. 1915.

The "debris of rock and plant residue that has accumulated through the centuries of struggle is the arable soil from which man obtains his bread. The study of this soil is a history of strife and struggle . . ." Soil-forming processes, the organic matter of the soil, soil structure, the forms of soil water and their movement, the water of the soil in its relation to plants, the control of soil moisture, the absorptive properties of soils, acid or sour soils, commercial fertilizers, farm manures, land drainage, tillage, irrigation, and dry farming are among the subjects discussed. The last chapter deals with the soil survey and its use.

- MCCOOL, M. M., MILLAR, C. E., AND GRANTHAM, G. M. (3228)
SOIL FERTILITY. Mich. Agr. Expt. Sta. Bull. 290, 39 pp., illus. 1920.

"A popular version of the summarized results of work by the station on the maintenance of the fertility of Michigan soils is presented in this bulletin. While dealing primarily with the use of fertilizers and the maintenance of a sufficient and well balanced amount of nutrient material in the soil, it also takes up the prevention of soil erosion, the use of soil amendments such as lime and organic matter, and draws special attention to the importance of maintaining the nitrogen supply by the growing and plowing under of leguminous crops."—Expt. Sta. Rec. 44: 815. 1921.

- McGEE, W. J. (3229)
FIELD RECORDS RELATING TO SUB-SOIL WATER. U. S. Bur. Soils Bull. 93, 40 pp. 1913.

The author states that the general purpose of this field work was to ascertain the relations between soil and water where the local rainfall is less than that required for crop production.

- McLAUGHLIN, W. W. (3230)
CAPILLARY MOVEMENT OF SOIL MOISTURE. U. S. Dept. Agr. Bull. 835, 70 pp. 1920.

As a basis for this information experiments were undertaken in 1915, and the data are given here in the form of a progress report. "The object of these experiments is to furnish specific data as to the capillary movement of moisture in the soils of the arid region . . . These data were obtained for different soils and under different conditions."

- MARBUT, C. F. (3231)
SOILS OF THE GREAT PLAINS. Ann. Assoc. Amer. Geogr. 13: 41–80. June 1923.

This paper describes the soils of the Great Plains region. General features of the soil, boundaries of the Great Plains, and soil belts are also given attention.

- SOILS OF THE UNITED STATES. *In* United States Department of Agriculture, Atlas of American Agriculture, pt. 3, 98 pp., illus. 1935. (3232)

The soil maps in this publication with descriptions of soils are based almost exclusively on the accumulated results of the soil survey of the United States Department of Agriculture and the general information obtained regarding soil characteristics. "Although the actual data presented in this report are contained mainly in the reports and maps of the Soil Survey, the principles of pedology, according to which the material has been interpreted and arranged, are contained in pedological literature."—Foreword.

- AND OTHERS. (3233)
SOILS OF THE UNITED STATES. U. S. Bur. Soils Bull. 96, 791 pp., illus. 1913.

This bulletin contains material under the following headings: Introduction, by Curtis F. Marbut; Soils of the Piedmont Plateau Province; Soils of the Appalachian Mountain and Plateau Province; Soils of the Limestone Valleys and Uplands Province; Soils of the Atlantic and Gulf Coastal Plains Province; and Soils of the River Flood Plains Province, by H. H. Bennett; Soils of the Glacial and Loessial Province; Soils of the Glacial

Lake and River Terrace Province, by J. E. Lapham and Curtis F. Marbut; Soils of the Great Plains Region; Soils of Rocky Mountain and Plateau Region; Soils of the Northwestern Intermountain Region; Soils of the Great Basin Region; Soils of the Arid Southwest Region; and Soils of the Pacific Coast Region, by Macy H. Lapham. Two appendices of soil data are included.

MARTIN, JACK. (3234)

USE OF FERTILIZERS IN EROSION CONTROL. U. S. Soil Conserv. Serv. Digest 3 (9): 4. June 1937. [Mimeographed.]

Report of results observed on fertilizer test plots, Las Posas project, Ventura County, Calif., during the 1936-37 season "substantiates the frequently recommended practice of applying fertilizers, particularly the nitrogenous forms, in establishing cover crops and other types of vegetation in erosion control."

MATHEWS, O. R. (3235)

WATER PENETRATION IN GUMBO SOILS OF THE BELLE FOURCHE RECLAMATION PROJECT. U. S. Dept. Agr. Bull. 447, 12 pp., illus. 1916.

"The gumbo soil of the Belle Fourche (S. Dak.) Reclamation Project offers problems in water penetration materially different from those in soils of other types. These differences are due largely to its peculiar physical characteristics."

MERRILL, G. P. (3236)

A TREATISE ON ROCKS, ROCK-WEATHERING AND SOILS. 400 pp., illus. New York, Macmillan Co. 1906.

"In the work here presented the writer has endeavored to bring together in systematic form the results of several years' study of the phenomena attendant upon rock degeneration and soil formation." In part III the principles involved in rock weathering are considered, among them erosion by water, and the action of plants and animals. Part V deals with the regolith and is divided into sedentary materials, transported materials (aeolian deposits, windblown sand, sand dunes, volcanic dust), and the soil. Soil is considered from many points: chemical nature, mineral composition, physical condition, weight, kinds and classification, color, age, and soils affected by plant and animal life.

MIDDLETON, H. E. (3237)

FACTORS INFLUENCING THE BINDING POWER OF SOIL COLLOIDS. Jour. Agr. Research 28: 499-513. May 10, 1924.

The importance of the binding power of soil colloids in relation to tillage operations, foundations, and the construction of dams and roads is discussed. "The influence of the soil colloids on the physical and chemical properties of soil is no doubt coming to be one of the most important studies in soil science."

(3238)

PROPERTIES OF SOILS WHICH INFLUENCE SOIL EROSION. U. S. Dept. Agr. Tech. Bull. 178, 16 pp. 1930.

"Certain of the physical and chemical properties of three soil types classed as erosive and of three types classed as nonerosive were studied and compared. 'The properties having the greatest influence on soil erosion are indicated by the dispersion ratio, the ratio of colloid to moisture equivalent, the erosion ratio, and the silica-sesquioxide ratio' . . ."—Expt. Sta. Rec. 63: 213. 1930.

(3239)

AND BYERS, H. G. THE SETTLING VOLUME OF SOILS. Soil Sci. 38: 15-26, illus. January 1934.

"A new soil-water, and a new soil colloid-water relation is defined and a method for its determination is described. The relation of this soil property to the colloid, silt, and clay content is discussed, as well as its relation to colloid, composition, organic matter content, and the erosion ratio. This soil-water relation, the settling volume of soils, is measured for 10 soils of widely different character. The soils are from the Erosion Experiment Stations and their general chemical and physical properties are known."

MIDDLETON, H. E., AND SLATER, C. S. (3240)

THE EXTENT TO WHICH THE EROSION OF A SOIL CAN BE ANTICIPATED BY LABORATORY PHYSICAL AND CHEMICAL MEASUREMENTS. Amer. Soil Survey Assoc. (Ann. Rept. 15) Bull. 16: 128-130, illus. May 1935.

Laboratory studies of soils of varying degrees of erodibility are considered. "Because erosion in its simplest expression is, after all, one of the effects of the action of water on soil, particular attention has been given to measurable soil-water relationships as a means of determining the relative erodibility of soils . . ."

—, SLATER, C. S., AND BYERS, H. G. (3241)

PHYSICAL AND CHEMICAL CHARACTERISTICS OF THE SOILS FROM THE EROSION EXPERIMENT STATIONS. U. S. Dept. Agr. Tech. Bull. 316, 51 pp. June 1932.

The data presented in this bulletin concern the chemical and physical properties of eight soil profiles: Houston, Kirvin, Vernon, Shelby, Colby, Cecil, Palouse, and Marshall series. Considerable information on run-off and erosion is given for four of the series, the Houston at Temple, Tex., the Colby at Hays, Kans., the Vernon at Guthrie, Okla., and the Kirvin at Tyler, Tex.

—, SLATER, C. S., AND BYERS, H. G. (3242)

PHYSICAL AND CHEMICAL CHARACTERISTICS OF THE SOILS FROM EROSION EXPERIMENT STATIONS—SECOND REPORT. U. S. Dept. Agr. Tech. Bull. 430, 62 pp., illus. 1934.

"In Technical Bulletin 316 of the United States Department of Agriculture . . . a report was given on the physical and chemical characteristics of the soils from the erosion experiment stations which had been established up to 1932. Since that bulletin was completed early in 1932, two new stations have been established, one on Clinton silt loam at La Crosse, Wis., and the other on Muskingum silt loam at Zanesville, Ohio. In addition, a series of plots have been established on Nacogdoches fine sandy loam at Tyler (Tex.) Station. The physical and chemical characteristics of these three soils, together with other data bearing on the erosional characteristics of all the soils, are presented in this bulletin."

MILLER, E. C. (3243)

RELATIVE WATER REQUIREMENT OF CORN AND SORGHUMS. Kans. Agr. Expt. Sta. Tech. Bull. 12, 34 pp., illus. 1923.

The purpose of the investigations was to study relative water requirement of corn and sorghums when grown under the same environmental conditions. "The results of these experiments indicate that there is little or no relationship between the water requirement of plants and their ability to produce a yield of grain in agricultural practice under conditions of limited and uncertain rainfall."

MILLER, M. F. (3244)

SOIL CONSERVATION IN AN IMPROVED AGRICULTURE. Mo. Agr. Expt. Sta. Bull. 362, 15 pp., illus. 1936.

"It has been said that the degree of intelligence shown by a nation in the use of its land serves as an index to its civilization. It would seem highly important, therefore, that the whole problem of soil conservation be faced squarely and that every effort be made to apply such conservation measures as investigations have shown to be feasible." Soil deterioration through leaching, crop removal, and erosion is discussed, and important principles of soil conservation through proper cropping, development of pastures, and replacement of nutrients are stressed.

— (3245)

SOIL MANAGEMENT IN THE OZARK REGION. Mo. Agr. Expt. Sta. Bull. 88, pp. 163-189. 1910.

"In 1905 the University of Missouri began a soil survey of the State, the object of which is to map the various soil types and to determine the most profitable methods of soil management for each . . . The great variety of soils existing in this region has naturally resulted in a great variation in the systems of cropping practiced." A table is given showing the composition of characteristic Ozark soils. Recommendations regarding

the handling of the border Ozark soils, including systematic crop rotation, are presented. The handling of grasses and pastures and the use of soiling crops are discussed. A soil map of the Ozark region is included.

MILLER, M. F., AND DULEY, F. L. (3246)

STUDIES OF WATER ABSORPTION, PERCOLATION, EVAPORATION, CAPILLARY WATER MOVEMENT, AND SOIL EROSION UNDER FIELD CONDITIONS. Mo. Agr. Expt. Sta. (Ann. Rept. 1918-19) Bull. 163: 65-66. 1919.

"The preliminary results of an experiment in which a series of plats was subjected to different systems of cropping and cultivation to determine their effects upon water entering the soil and upon soil erosion . . ."—Expt. Sta. Rec. 41: 622. 1919.

MOYER, R. T. (3247)

AGRICULTURAL SOILS IN A LOESS REGION OF NORTH CHINA. Geogr. Rev. 26: 414-425, illus. July 1936.

Presents a study of the soils of the Province of Shansi, China, and includes topographic and climatic descriptions of the Province. Soils are grouped as plain soils, Tatung plain soils, soils of the north and central basins and the western plateau, and southeastern soils. Presents, also, soil-use improvement methods practiced.

MURPHY, H. F., AND DANIEL, H. A. (3248)

SOME CHEMICAL AND PHYSICAL PROPERTIES OF NORMAL AND SOLONETZ SOILS AND THEIR RELATION TO EROSION. Soil Sci. 39: 453-461. June 1935.

"Soils locally designated as 'alkali spots' or 'slick spots' are found rather frequently in central Oklahoma bordering the Permian-Pennsylvanian contact . . . The presence of these so-called 'alkali spots' is probably due to the accumulation of sodium salts in the sediments laid down by the receding sea, as the water in the deeper surface reservoirs evaporated as a result of arid conditions." Experimental data in tables indicate the rapidity at which Solonetz soils may erode. Gully and sheet erosion on these soils and the problems connected with terracing them are discussed.

MUSGRAVE, G. W., and FREE, G. R. (3249)

SOME FACTORS WHICH MODIFY THE RATE AND TOTAL AMOUNT OF INFILTRATION OF FIELD SOILS. Jour. Amer. Soc. Agron. 28: 727-739, illus. September 1936.

"The study as a whole would indicate that, although the infiltration rate may be greatly modified by changes in porosity induced by one or another means and relatively by soil moisture content or vegetative cover, yet the dominant factor may well be the soil type, at least insofar as comparison between the permeable Marshall and the relatively impermeable Shelby are concerned." The authors discuss literature pertaining to this subject and give methods and results in tables and diagrams.

MYERS, H. E. (3250)

THE DIFFERENTIAL INFLUENCE OF CERTAIN VEGETATIVE COVERS ON DEEP SUBSOIL MOISTURE. Jour. Amer. Soc. Agron. 28: 106-114. February 1936.

Studies on subsoil moisture depletion at the Kansas Experiment Station show that: "The results obtained are so conclusive as to warrant the generalization that alfalfa growing on the soil for several years under conditions of limited rainfall reduces the available supply of moisture in the subsoil to depths much below the normal penetration of seasonal precipitation." Results are presented in tabular form.

NEAL, J. H. (3251)

MOISTURE RELATIONSHIPS OF SOILS IN SITU. Agr. Engin. 13: 128-132, illus. May 1932.

"For the purpose of studying some of the moisture properties of soils in their undisturbed natural position, and their relationship to the drainage of these soils, fifteen sets of 6-inch cubes [of soil] were taken at alternate 6-inch intervals to a depth of 4 feet." The findings of this investigation are given and considerable technical data presented.

- NICKELS, F. F., BAUR, A. J., GOLDSTON, E. F., AND YEDINAK, A. (3252)
SOILS OF THE BANISTER RIVER WATERSHED. U. S. Soil Erosion Serv. [Danville, Va.] 24 pp., illus. February 1935. [Mimeographed.]
"The purpose of this bulletin is to present a general discussion of soil and erosion conditions in this area and to describe the soils as to their 'make-up', erosiveness, fertility, distribution, adaptability to various crops and suggestions for erosion control."
- OBERHOLZER, P. C. J. (3253)
THE DECOMPOSITION OF ORGANIC MATTER IN RELATION TO SOIL FERTILITY IN ARID AND SEMI-ARID REGIONS. Soil Sci. 42: 359-379. November 1936.
Percolation studies and influence of moisture on the decomposition of organic matter are included.
- OLMSTEAD, L. B. (3254)
SOME MOISTURE RELATIONS OF THE SOILS FROM THE EROSION EXPERIMENT STATIONS. U. S. Dept. Agr. Tech. Bull. 562; 45 pp., illus. 1937.
"A number of separate investigations are presented in this report because they all pertain to soil-moisture constants within the capillary range and because most of the soil samples used in each investigation were the profile samples of the erosion experiment stations of the Department of Agriculture . . . The work on centrifugal moisture concerns the effect of high centrifugal forces on the moisture content of soils."
Literature cited, pages 42-44.
- , ALEXANDER, LYLE T., AND MIDDLETON, H. E. (3255)
A PIPETTE METHOD OF MECHANICAL ANALYSIS OF SOILS BASED ON IMPROVED DISPERSION PROCEDURE. U. S. Dept. Agr. Tech. Bull. 170, 22 pp., illus. 1930.
"This bulletin reports an investigation of methods of obtaining dispersion of soil material, with special reference to the effect of acid treatment and the use of alkaline dispersing agents. A method for the removal of organic matter from manganese soils is included. A procedure for mechanical soil analysis, based on the most satisfactory of several methods of soil dispersion investigated, is here outlined."
- PHILLIPS, S. W. (3256)
SOIL REBUILDING AT THE RED PLAINS EROSION STATION. Jour. Amer. Soc. Agron. 25: 346-350. May 1933.
The writer describes the station farm and its soil types. "The work of the Station is carried out under a three-way cooperative arrangement between the U. S. Dept. of Agriculture, the Oklahoma A. & M. College, and the Guthrie Chamber of Commerce." Basic studies such as the relation of erosion to yield and quality of cotton, and to moisture and various methods of erosion control are presented.
- POWERS, W. L. (3257)
IRRIGATION AND SOIL-MOISTURE INVESTIGATIONS IN WESTERN OREGON. Oreg. Agr. Expt. Sta. Bull. 122, 110 pp. 1914.
"The work herein reported is a continuation of the investigation inaugurated by the Office of Experiment Stations, in cooperation with determining the value of irrigation for increasing and insuring productivity of the agricultural lands in the semi-humid Willamette Valley and other similar valleys of Western Oregon . . ."
- RAMANN, E. (3258)
THE EVOLUTION AND CLASSIFICATION OF SOILS. 127 pp. illus. 1903. [Translated by C. L. Whittles, Cambridge, W. Heffer & Sons., Ltd., 1928.]
"The following is an attempt to summarize the fundamental facts of the formation of soils, to consider the close connection between climate and soil in greater detail, to indicate how soils are related to one another and so lead up to a classification of soil types, a system of soils, which rests on a true scientific basis."
- RANDALL, J. E. (3259)
SOIL PROTECTION AND SOIL IMPROVEMENT. 97 pp., illus. Indianapolis, T. A. Randall & Co. 1922.
"The need of complete information in one handy volume . . . covering the various phases pertaining to the protection and improvement of our

soils, influenced the author in compiling the subject matter herewith set forth. The value of tile underdrainage in the upbuilding of the farm lands was considered of such vital importance that it is treated at length, showing the treatment and the results obtained in different types of soils . . ."

- ROBERTS, G. (3260)
SOIL MANAGEMENT FOR KENTUCKY. Ky. Agr. Col. Ext. Cir. 272, 59 pp. April 1934.

The writer gives statistics on erosion control and discusses prevention of leaching, tillage and drainage, fertilizers, planning, and establishing rotation crops. After a summary and recommendations, a bibliography on soils and crops is given.

- ROBINSON, G. W. (3261)
SOILS—THEIR ORIGIN, CONSTITUTION, AND CLASSIFICATION. 390 pp., illus. New York, N. Van Nostrand Co.; London, Thomas Murray & Co. 1932.

In this introduction to the science of pedology, the subject of soil erosion is treated, pages 51-53 and 62-70.

- ROGERS, H. T. (3262)
SOME PHYSICO-CHEMICAL RELATIONSHIPS FOUND IN FOUR EROSIIVE SOILS OF THE PIEDMONT PLATEAU REGION. Jour. Amer. Soc. Agron. 29: 1-9. January 1937.

"The claypan nature of the B horizon of the Iredell, White Store, Helena, and Orange soils of the Piedmont Plateau Region, linked with their apparent susceptibility to severe erosion, suggested a comparative study of their profiles . . . An analysis of the data obtained in this investigation reveals some significant relationships existing between certain physical and chemical properties of these soils. These relationships, with some of the supporting data, are presented and discussed herein."

- RUFFIN, EDMUND. (3263)
ESSAY ON CALCAREOUS MANURES. 242 pp., illus. Petersburg, Va., J. W. Campbell. 1832.

"The object of this essay is to investigate the peculiar features and qualities of the soils of our tide-water district, to show the causes of their general unproductiveness, and to point out means, as yet but little used, for their effectual and profitable improvement . . . The theoretical opinions supported in this essay, together with my earliest experiments, with calcareous manure, were published in the 'American Farmer' in 1821." Instructions for the digging and carting of marl, and for the use of lime are given, and experiments in the use of both are described. Machines for the raising of both wet and dry marl are illustrated.

- SALTER, R. M., LEWIS, R. D., AND SLIPHER, J. A. (3264)
OUR HERITAGE—THE SOIL. Ohio Agr. Col. Ext. Bull. 175, 20 pp. 1936.

Factors involving soil deterioration and improvement, also standards established to evaluate these factors are discussed and data offered showing methods of calculating annual soil productivity balance as applied to the State of Ohio based on studies in 1929.

- SHREVE, FORREST, AND TURNAGE, W. V. (3265)
THE ESTABLISHMENT OF MOISTURE EQUILIBRIUM IN SOIL. Soil Sci. 41: 351-355. May 1936.

Describes experiments to determine moisture content, dry-weight basis, for layers of alluvial clay at different stages during a 2-year period. Results presented in tabular form indicated that the movement at the low percentages prevailing in desert soils is very small, at least in heavy soils. The authors show how the only rapid changes in moisture content are the increases due to heavy rainfall and the decreases at the surface by evaporation or at lower levels by root absorption.

- SCOFIELD, CARL S., MOON, C. LLOYD, AND KNIGHT, ELMER W. (3266)
SUBSOIL WATERS OF NEWLANDS, NEV., FIELD STATION. U. S. Dept. Agr. Tech. Bull. 533, 30 pp. 1936.

"The purpose of this report is to discuss conditions in respect to the subsoil water that constitutes one of the features of the problem of crop

production not only on the Newlands Field Station but elsewhere on the Newlands reclamation project." Deals chiefly with investigations inaugurated to obtain information on the annual or seasonal fluctuations in the position of the water-saturated zone of the subsoil and the nature and concentration of the salinity of the subsoil water.

SHALER, N. S.

(3267)

THE ORIGIN AND NATURE OF SOILS. U. S. Geol. Survey Ann. Rept. 12: 213-345, illus. 1890.

"The object of this report is to set before the general reader a somewhat popular account of the origin and nature of soils; to show the importance of their relations not only to the well being of men but their influence on the course of the physical and organic events which have determined the geologic history of the planet." Contents: Processes of Soil Formation; Physiology of Soils; Certain Peculiar Soil Conditions; Action and Reaction of Man and the Soil.

SHANTZ, H. L.

(3268)

MEMOIR OF C. F. MARBUT; WITH BIBLIOGRAPHY OF HIS WORKS. Ann. Amer. Geogr. Assoc. 26: 113-123. June 1936.

Not examined.

SHAW, C. F.

(3269)

THIRD INTERNATIONAL CONGRESS OF SOIL SCIENCE. Geogr. Rev. 26: 139-141. January 1936.

Résumé of papers given at the congress held at Oxford, England, July 30 to August 7, 1935, and a description of exhibits and excursions.

SHEAR, G. M., AND STEWART, W. D.

(3270)

MOISTURE AND PH STUDIES OF THE SOIL UNDER FOREST TREES. Ecology 15: 145-153. April 1934.

Data presented here have been collected chiefly from reforested areas. "The effect of forest planting on the pH of the soil is of great ecological significance. Most of the research that has been done to determine soil moisture in forested areas is limited to the upper layers of soil, generally in connection with successful studies."

SHUTT, F. T.

(3271)

CONSERVATION OF SOIL MOISTURE. Canada Expt. Farms Repts. 1900: 154-159; 1912: 142-143; 1913: 226-227.

The necessity for the farmer "by proper methods of culture, to store up a large portion of the year's precipitation for the use of the crops of the succeeding year" is stressed, and data obtained at the experimental farms in Manitoba and the Northwest Territories are given in the report for 1900.

The report for 1912 describes plan for continuous series of experiments, inaugurated in the autumn of 1910, on certain of the western experimental farms from which data on the yields of grain, etc., would be obtained. In the 1913 report the writer states: "Though final conclusions must be deferred it is possible to indicate some of the more striking results obtained in prairie breaking; the influence on moisture content of 'depth and time of ploughing'; and subsoil-packing."

(3272)

THE CONTROL OF SOIL MOISTURE. Canada Expt. Farms Repts. 1904: 157-164.

Two series of experiments on the control of soil moisture instituted at the experimental farm at Ottawa, Ontario, are described and results discussed. Data from other experiments at Nappan, Nova Scotia, farther west are also given of the effect of growing rye on the moisture content of the soil, and the effect on the moisture content of varying periods of cultivation.

(3273)

THE CONTROL OF SOIL MOISTURE IN ORCHARD SOILS. Canad. Expt. Farms Repts. 1905: 133-137; 1906: 150-153.

Experiments at the experimental farm, Ottawa, Ontario, and Nappan, Nova Scotia, are described and results given.

SHUTT, F. T.

(3274)

THE MOISTURE CONTENT OF PACKED AND UNPACKED SOILS. Canada Expt. Farms Rpts. 1911: 172.

"Further observations (E. S. R. 24, p. 421) on the effect of subsurface packing in conserving soil moisture showed no very great advantage from this practice, although it appeared that the packed land started the season with slightly more moisture than that which had not been so treated."—Expt. Sta. Rec. 27: 320. 1912.

SIEVERS, F. J., AND HOETZ, J. F.

(3275)

THE SILT LOAM SOILS OF EASTERN WASHINGTON AND THEIR MANAGEMENT. Wash. Agr. Expt. Sta. Bull. 166, 62 pp., illus. 1922.

"The soil in the area covered by this bulletin is in the main a silt loam and practically all of the investigational work used as a basis was conducted on the Experiment Station Farm at Pullman, Wash. The results properly interpreted will apply to all silt loam soils in Eastern Washington receiving more than 15 inches of rain annually . . ." Subjects treated are climate, cropping system, relation between available nitrogen and quality of grain, soil erosion, crop rotation, drainage, etc.

SLATER, C. S. AND BYERS, H. G.

(3276)

A LABORATORY STUDY OF THE FIELD PERCOLATION RATES OF SOILS. U. S. Dept. Agr. Tech. Bull. 232, 24 pp., illus. 1931.

Data on percolation rates of various soil types, erosion, and soil permeability are presented. The summary states in part: "The ratios for erosion and for the permeability of soils show that these properties are inversely proportional in terms of the factors of the percolation ratio."

SMITH, F. B., BROWN, P. E., AND RUSSELL, J. A.

(3277)

THE EFFECT OF ORGANIC MATTER ON THE INFILTRATION CAPACITY OF CLARION LOAM. Jour. Amer. Soc. Agron. 29: 521-525, illus. July 1937.

The purpose of the present work was to study the influence of organic matter through use of the method employed by Musgrave and Free. Experiments were conducted at the Iowa Agricultural Experiment Station. "The infiltration capacity of Clarion loam in a 4-year rotation of corn, corn, oats and clover was found to be relatively high, but it was increased materially by additions of manure."

SMITH, W. O.

(3278)

SORPTION IN AN IDEAL SOIL. Soil Sci. 41: 209-230. March 1936.

Capillary condensation is, for most ideal soils, chiefly responsible for the sorbed liquid. Surface absorption is important and need not be considered excepting when the grains approach colloidal size. Actual soils are a mixture, and the predominant sorption process will be determined by the amount of colloidal water present. Includes eight figures and a table which summarizes vapor pressures associated with King's experiments.

SNOW, L. M.

(3279)

A COMPARATIVE STUDY OF THE BACTERIAL FLORA OF WIND-BLOWN SOIL: I. ARROYO BANK SOILS, TUCSON, ARIZ. Soil Sci. 21: 143-165, illus. February 1926.

"Although a considerable amount of work has been done upon the bacteria in soil, no one apparently has made a comparative study of the number and type of bacteria in ecologically equivalent types of soil in different regions. It was, therefore, with this aim in view that the series of studies . . . was started. The type of soil selected for the study was arid, wind-blown soil, such as is found in the dunes along the coast and around Lake Michigan, and in the dry regions in the interior of the continent. In order to facilitate the handling of such a comprehensive piece of work, the approach was made through the study of certain types of aerobic bacteria that grow in ordinary culture conditions." Methods and materials, experiments and results with all other data are described and followed by a discussion of the work done, and a summary.

STAUFFER, R. S.

(3280)

INFLUENCE OF SOIL MANAGEMENT ON SOME PHYSICAL PROPERTIES OF SOIL. Jour. Amer. Soc. Agron. 28: 900-906. November 1936.

Studies at Illinois Agricultural Experiment Station show that ". . . soil on which poor cropping systems have been followed are much more sub-

ject to destruction by erosion than soils on which good systems have been followed . . . Results indicate that good physical condition of a soil can be maintained if good systems of cropping and management are followed." Literature cited, pages 905-906.

STEPHENSON, R. E.

(3281)

THE CONSERVATION OF PHYSICAL SOIL PROPERTIES. Rural New Yorker 96: 427. May 22, 1937.

Explains changes in physical properties that occur in soils long under cultivation and subjected to some degree of erosion, through bad tillage practices.

(3282)

HUMUS, INSECTS, AND SOIL STRUCTURE. Calif. Cult. 83: 438. June 6, 1936.

Explains the effect upon soil organisms when soil organic matter is depleted, and humus renewal as cure for depleted soils.

(3283)

THE MOISTURE PROBLEM IN HEAVY SOILS. Calif. Cult. 84: 27, 46. January 16, 1937.

The writer discusses various types of tight, sticky, waxy, clay soils and their potential improvement through irrigation. "The conclusion is unavoidable that soils are only as deep as roots penetrate and utilize moisture and nutrients . . . Irrigation may control only surface soil moisture or the moisture of a natural shallow root zone . . ."

(3284)

WATER VS. DRYING THE SOIL. Calif. Cult. 83: 484. June 20, 1936.

Points out the advantages of removal of soil capillary water before irrigation.

—, AND SCHUSTER, C. E.

(3285)

PHYSICAL PROPERTIES OF SOILS THAT AFFECT PLANT NUTRITION. Soil Sci. 44: 23-36. July 1937.

Report based on the study of some 30 soils, mostly in walnut or filbert orchards.

STEVENSON, W. H., BROWN, P. E., AND FORMAN, I. W.

(3286)

MAINTAINING FERTILITY IN THE WISCONSIN DRIFT SOIL AREA IN IOWA. Iowa Agr. Expt. Sta. Bull. 161, pp. 235-263. 1915.

The experiments reported in this work show that applications of various fertilizing materials bring about increases in crop production and that without treatment there is a gradual decline in crop yields. "No soil can remain permanently fertile unless care is taken that all plant food removed by the crops grown is returned to the soil and the physical condition of the soil is kept favorable for crops." Phosphorus, potassium, manuring, drainage, cultivation, liming, and crop rotation are among the recommendations for Carrington loam in Iowa.

TEXAS AGRICULTURAL EXPERIMENT STATION.

(3287)

[SOIL FERTILITY STUDIES AT THE TEXAS STATION.] Tex. Agr. Expt. Sta. Rept. 38: 25, 26, 28, 29, 31. 1925.

"Data from rotation, soil improvement, and soil moisture and fertility conservation experiments are briefly reported."—Expt. Sta. Rec. 55: 320. 1926.

(3288)

SOIL FERTILITY WORK. Tex. Agr. Expt. Sta. Rept. 40: 104-195. 1927.

"The importance of terracing for the conservation of fertility and the prevention of loss of soil by erosion is noted, together with the recommendation that organic matter be incorporated at every possible opportunity, and that as frequent a rotation of crops as possible be made. Fertilizer experiments mostly of the usual type included applications of 250 and 500 lbs. per acre of sulfur, resulting in an apparent slight gain in the yield of cowpeas. This gain was not sufficient, however, to pay for the sulfur used."—Expt. Sta. Rec. 59: 719. 1928.

THOM, C. C., AND HOTZ, H. F.

(3289)

FACTORS INFLUENCING THE WATER REQUIREMENTS OF PLANTS. Wash. Agr. Expt. Sta. Bull. 146, 64 pp., illus. 1917.

The work reported in this bulletin was undertaken with a view to determining somewhat in detail the relative amounts of water used by different crops and the factors influencing the same under existing climatic and soil conditions. The investigations of the relative water requirement of different crops were carried on in large tanks placed in the field, and also in field crops. The authors find that numerous conditions surrounding plants influencing growth, water requirements, adaptability, and plant habits make it impossible to give definite water requirement for any plant, or even the relative order in which a given number of varieties will stand in respect to this factor. Results of all findings are presented.

THOMPSON, W. R.

(3290)

MOISTURE AND FARMING IN SOUTH AFRICA. 260 pp., illus. [Johannesburg], Central News Agency, Ltd. 1936.

The author's task has been to scrutinize available evidence as to the correlation between the proper utilization of available rainfall and successful agriculture in the Union of South Africa. "This book . . . should be of very material assistance in effecting a proper adjustment of farming to our natural resources."

Bibliography, pages 249-255.

THORP, J.

(3291)

THE SOILS OF CHINA. Asia 37: 291-294, illus. April 1937.

States that the farmers of China have made great efforts to check soil washing and deposition by terracing the loess hills from top to bottom, but their efforts can only temporarily stave off disaster.

—, AND HOU, K. C.

(3292)

SOILS OF NORTHERN AND NORTHWESTERN CHINA. Geol. Survey of China (Peiping) Soil Bull. 12, 155 pp., illus. July 1935.

"Data for this report was [were] collected by the authors during the summer and early autumn of 1934 . . ." soil erosion and its control are discussed, pages 92-98.

THROCKMORTON, R. I., AND DULEY, F. L.

(3293)

SOIL FERTILITY. Kans. Agr. Expt. Sta. Bull. 260, 60 pp., illus. 1932.

The more important soil regions and soil groups of Kansas are shown on a soil map. The authors discuss trends of fertility and crop yields, composition of the soil, available and unavailable material for plants, chemical analysis of the soil, biological inhabitants of the soil, the way in which soils lose or gain fertility, and the maintenance of fertility through soil-erosion control. Crop rotations and other means are suggested. Commercial fertilizers, their value and use, are discussed at length.

TSYGANOV, M. S.

(3294)

THE INFLUENCE OF MOISTENING AND OTHER NATURAL FACTORS ON THE DYNAMICS OF THE AGGREGATE COMPOSITION OF SOILS. Pedology 1: 125-131. 1936.

"Destruction of the soil structure in the surface layer is caused by atmospheric agencies and the physico-chemical changes in the absorbing complex. At 3-8 cm. depth it is caused principally by the changes in the absorbing complex."

UNITED STATES DEPARTMENT OF AGRICULTURE, LIBRARY.

(3295)

CURTIS FLETCHER MARBUT. LIST OF PUBLICATIONS. U. S. Dept. Agr. Libr. Notes 11: 51-54. January 1936. [Mimeographed.]

Lists Marbut's writings from 1895 to 1935.

UNITED STATES EXTENSION SERVICE.

(3296)

THE PURDUE KIT TESTS 50,000 SOIL SAMPLES. U. S. Ext. Serv. Rev. 7: 113-114, illus. August 1936.

A description of the Purdue kit for making rapid chemical soil and plant tests in Indiana. A number of the kits have gone to the Soil Conservation Service for use in the 11 Hoosier camps.

VAN DERLINDEN, LEE.

(3297)

METALS IN SOILS, FERTILIZER, FOODS AND HEALTH. Amer. Fert. 84: 10, 24, 26. May 30, 1936.

Discusses importance of such elements as iron, copper, zinc, manganese, barium, vanadium, and nickel with reference to food for growing plants on worn-out soils. From an address before the Farm Chemurgic Council, Fresno, Calif., March 28, 1936.

VEIHMEYER, F. J., AND HENDRICKSON, A. H.

(3298)

SOIL MOISTURE AT PERMANENT WILTING POINT OF PLANTS. Plant Physiol. 3: 355-357. July 1928.

"In extensive experiments extending over a period of years, the writers have observed a remarkable constancy of the residual moisture content for a given soil when permanent wilting is attained under widely varying evaporating conditions." The results of experiments with sunflowers are given in tabular form.

VERMONT AGRICULTURAL EXPERIMENT STATION.

(3299)

SOIL PHYSIOGRAPHY. Vt. Agr. Expt. Sta. Bull. 143: 196-245. 1909.

Discusses the fundamentals of soil development from rock and organic matter.

WAKSMAN, SELMAN A.

(3300)

SOIL DETERIORATION AND SOIL CONSERVATION FROM THE VIEWPOINT OF SOIL MICROBIOLOGY. Jour. Amer. Soc. Agron. 29: 113-122. February 1937.

Presented at meeting of American Society of Agronomy, Washington, D. C., November 19, 1936, as part of symposium on the scientific aspects of soil conservation.

Literature cited, pp. 121-122.

WEAVER, J. E., AND HARMON, G. W.

(3301)

QUANTITY OF LIVING MATERIALS IN PRAIRIE SOILS IN RELATION TO RUN-OFF AND SOIL EROSION. Nebr. Univ. Conserv. and Survey Div. Bull. 8, 53 pp., illus. 1935.

A study of the quantity and types of living plant material in native prairies and pastures and the parts played by living underground plants in promoting absorption of water by soil. These materials "are composed of roots, rhizomes, and the bases of stems. In the case of non-grassy species of forbs, they sometimes include corms, bulbs, and certain other underground plant structures."

WEST, E. S., AND HOWARD, A.

(3302)

A NOTE ON THE EFFECT OF GREEN MANURING ON THE WATERHOLDING CAPACITY OF SOILS. Aust. Council Sci. and Indus. Research Jour. 9: 65-66. February 1936.

"Nine years of continued use of green manure has increased the sticky point of the top 30 cms. of the soil by about 1.25 percent (of oven-dry weight soil). This represents an increase in the field capacity of the soil as a whole, equivalent to about 6 mms. (0.25 inches) of rain, so that green manuring under these conditions is of little importance from the point of view of increasing the water-holding capacity of the soil. Its beneficial effects lie in other directions."—Summary.

WHITFIELD, A. F.

(3303)

SOIL BUILDING WITH TERRACES. Agr. Engin. 12: 120-122, illus. April 1931.

"The object of this paper is to describe the natural soil . . . to show the sources from whence materials that form this soil were obtained, and to show nature's method of putting them together to make a perfect soil; then to tell how a soil similar is rapidly being artificially made by regulating the amount and distribution of sand, and by impounding the muddy waters of swollen streams between terraces." A map of a soil-building project for a truck patch is included.

WHITSON, A. R., AND HENDRICK, H. B.

(3304)

EXTENSION COURSE IN SOILS. U. S. Dept. Agr. Bull. 355: 24-31. 1916.

The writers discuss water-holding capacity of soils, organic matter, water required by growing crops, rainfall in relation to water requirements of crops, and other questions on water supply.

- WHITSON, A. R., AND WALSTER, H. L. (3305)
SOILS AND SOIL FERTILITY. 315 pp., illus. St. Paul, Minn., Webb Publishing Co. 1912.

In this study, outlining the principles of soil fertility, the subject of soil erosion is treated in chapter XIII, pages 204-211. Erosion of hillsides is discussed, pages 108-109.

- WISCONSIN AGRICULTURAL EXPERIMENT STATION. (3306)
SOIL AND FERTILIZER STUDIES AT THE WISCONSIN STATION. Wis. Agr. Expt. Sta. Bull. 410: 1-6, illus. 1930.

"The gravity of the erosion problem, in the western and southwestern sections of the State especially, is stressed, the aggravating effect of cultivation and the normal character and progress of erosion damage are briefly described, and the advising of various control measures is reported, together with the projected cooperation of the station with the Lake States Forest Experiment Station in a study of erosion . . ."—Expt. Sta. Rec. 63: 16.—1930.

STREAM FLOW, SEDIMENTATION, AND RELATED SUBJECTS

- ANONYMOUS. (3307)
CLAY IN SUSPENSION DECREASES SCOURING OF RIVER BED. Engin. News-Rec. 117: 544. October 15, 1936.

A report of an investigation into the relative scouring effects of clear and muddy water in swiftly flowing rivers; part of a study in connection with Boulder Dam.

- CLEAN OLD DITCHES TO TAKE RUN-OFF FROM BLUFFS WITHOUT SILTING. Engin. News-Rec. 80: 1083-1084. June 6, 1918. (3308)

The work on Farmers Ditch and Drainage District No. 1, of Woodbury County, Iowa, is summarized.

- CURRENT PERIODICAL LITERATURE. Civ. Engin. 6: 14. July 1936. (3309)

"Comparative study of calibration curves for circular, rectangular, and triangular weirs, including results of original experiments performed at Hydraulic Institute of University of Padua, Italy."

- AN EARTH-HANDLING PROBLEM. Engin. News-Rec. 116: 747. May 21, 1936. (3310)

New earth-handling problems arise with the necessity to clear reservoirs of silt. Patient study and large-scale experimenting are called for "so that the requirements of the problem may be clearly defined in practical terms."

- EFFECT OF DEFORESTATION. Forestry and Irrig. 8: 146. April 1902. (3311)

Results of observations on discharge and sediment of two contiguous basins at the Salt River Reservoir are presented.

- FLOOD FLOW COMPARISONS. Engin. News-Rec. 116: 836. June 11, 1936. (3312)

Includes a table showing peak stages and discharges of various rivers that were affected during the spring floods of 1936. Data prepared from records collected by the United States Geological Survey.

- HYDROLOGIC STUDIES RECOMMENDED. WATER RESOURCES COMMITTEE RECOMMENDS A FEDERAL PROGRAM FOR STUDY OF HYDROLOGIC DATA. Engin. News-Rec. 117: 487. October 1, 1936. (3313)

"According to the plan, the Federal government would establish a basic network of stations to measure precipitation, snowfall, streamflow, ground-water levels, evaporation, and water supply."

- KENNEDY'S LAWS OF SILTING. Engin. News 65: 701. June 8, 1911. (3314)

Studies in India convinced R. G. Kennedy that there is a "critical velocity" in any stream in which all silt already in suspension is carried

without further deposition and at which also no further silt is scoured from the sides or bottom. His formula for this velocity is reviewed.

ANONYMOUS.

(3315)

LAND DRAINAGE; OBSERVATIONS ON THE EFFECTS OF LOWERING THE LEVEL OF A RIVER. Scot. Jour. Agr. 17: 310-313. July 1934.

Experience acquired in the course of preparing schemes of drainage after systematically watching the behavior of rivers in flood is described. The object of the proposed drainage works was to relieve from risk of flooding the area usually inundated in times of heavy rainfall and to improve the gradient of the river. Some observations made on the process and effects of the erosion of riverbanks are given.

(3316)

LARGEST IRRIGATION LABORATORY DEDICATED. West. Farm Life 38: 7, illus. July 1, 1936.

Announces completion of modern hydraulics laboratory at Colorado State College. "Besides being equipped to study and check problems related to the construction of huge dams, the laboratory will be used to solve irrigation and water problems for farmers, ditch companies, and cities, and to develop useful irrigation devices such as the Parshall flume and sand traps. There are also facilities for fundamental scientific research, and a station for conditioning meters for measuring the rate of water flow in streams."

(3317)

A RESERVOIR SILTING CASE. Engin. News-Rec. 116: 695, illus. May 14, 1936.

"Neubert Springs Dam, a 15-ft. earth embankment built in 1921 to form a millpond of $2\frac{1}{2}$ acres 7 miles south of Knoxville, Tenn., when washed out by a flood on March 24 was found to have accumulated silt in the 15 years of its existence to within about 2 ft. of pond level, or 85 per cent full. The deposit totaled about 25,000 cu. yd. or $15\frac{1}{2}$ acre-feet—about 1 acre-foot of deposit per year, according to estimates made by engineers of the Tennessee Valley Authority."

(3318)

SAND TRAP FOR SELF CLEANING OF CANALS AND STREAMS. Pub. Works 65: 16. November 1934.

This article describes three different types of sand traps developed by R. L. Parshall, by means of which a small part of the stream can be diverted through them to carry out of the main stream a concentrated load of sand, silt, and debris.

(3319)

70,000 TONS OF SILT DAILY. Sci. Amer. 154: 91. February 1936.

Describes desilting plant to be constructed 15 miles northeast of Yuma, Ariz., at Imperial Dam. As planned, the plant will consist of 6 settling basins to be fed by an influent channel, 4 flow-control roller gates, and 72 Dorr clarifiers for the removal of deposited silt. Sluicing channels will return the silt to the Colorado River below the diversion dam.

(3320)

SOIL EROSION SURVEY IN SOUTHEASTERN STATES. Science 83 (Sup.): 6-7. January 17, 1936.

The relation between soil erosion and the silting of six reservoirs under study in a new survey in Virginia, North Carolina, South Carolina, and Georgia is discussed.

(3321)

SOIL EROSION VERSUS POWER DEVELOPMENT. S. C. Soil Conserv. News, pp. 6-7. May-June 1936.

Discusses silting of reservoirs in the Piedmont, with special reference to the Lake Murray earthen dam.

(3322)

STREAM CONTROL WORK. Reedy Creek Farm Coop. 3 (2): 3-4. February 1936. [Mimeographed.]

This article recommends small stream control for the protection of valuable bottom land. Straightening a channel is the wrong procedure, as it means a sharper grade with greater flow velocity and cutting of banks. A

more satisfactory method is the clearing of channels and bank protection by means of brush or rock riprap, rock or log cribbing, and carefully placed plantings.

ANONYMOUS.

WATER LEVELS OF RIVERS AFTER THE DROUGHT. *Science* 80 (Sup.): 9. August 3, 1934. (3323)

Levels of the Mississippi, Missouri, Arkansas, and Red Rivers during the fifth month of the drought of 1934 are discussed.

AMERICAN GEOPHYSICAL UNION.

TRANSACTION . . . Natl. Research Council, Amer. Geophys. Union Ann. Meeting 17, pt. 2, 300 pp., illus. 1936. (3324)

Reports and papers in this volume devoted to soil and water conservation and related subjects are as follows: Report of the Committee on Rainfall and Runoff 1935-36, pp. 302-306; The Hayford Method of Estimating Surface Runoff Versus the Sherman "Unit-Graph" Method, by J. A. Folse, pp. 306-309; A Review of "A New Method of Estimating Stream-Flow," by J. A. Folse, by Merrill Bernard, pp. 309-312; Notes on the Transportation of Silt by Streams, by M. P. O'Brien, pp. 431-436; The Twin Problem of Erosion and Flood-Control, by H. M. Eakin, pp. 436-439; United States Geological Survey Records of Suspended and Dissolved Matter in Surface-Waters, pp. 444-446, by N. C. Grover.

ALLIS, JOHN A.

HOW SILT IS MEASURED ON PROJECT STREAMS. *Soil Conserv.* 1: 5-6, illus. August 1935. (3325)

Describes methods for measuring silt at Stillwater Creek project in Oklahoma.

ANDERSON, G. E.

EXPERIMENTS ON THE RATE OF WEAR OF SAND GRAINS. *Jour. Geol.* 34 (2): 144-158, 1926. (3326)

"The experiments described in this paper were made to obtain more definite data on the relative rates of mechanical wear, on sand grains, by wind and water under constant conditions. The results show, contrary to the general belief, that sand submerged in water wears down more rapidly than dry sand transported over the same distance."

ANDREWS, ERNEST C.

EROSION AND ITS SIGNIFICANCE. *Roy. Soc. N. S. Wales* 45: 116-136. 1912. (3327)

"The present note is an attempt to coordinate our knowledge of stream processes, and to assign them their proper place in the sculpturing of land forms." Erosion and its processes, transportation, and floods are considered. The main thesis of this paper is that in areas of homogeneous rocks or of rocks comparable in hardness, such as dense sandstones, quartzites, granites, or crystalline schists, the existence of two peneplain surfaces in association but separated by youthful topography must be explained by activities other than those of ordinary corrosion.

ASHE, W. W.

RELATION OF SOILS AND FOREST COVER TO QUALITY AND QUANTITY OF SURFACE WATER IN THE POTOMAC BASIN. *U. S. Geol. Survey Water-Supply Paper* 192: 299-335, illus. 1907. (3328)

This paper begins with a general discussion on the effect of soils on the turbidity of water, with direct reference to the Potomac River. The soils east of the Allegheny front are considered: Cecil and Chester, Penn, limestone, shale, and sandstone, and also the soils west of the Allegheny front. In discussing the erosion of farm land the writer states that the primary cause of erosion is the failure of the soil to absorb the rain water which falls upon it. "The eroding and transporting action of water is increased by the increase in its volume; it is also increased four times by doubling the gradient." The effect of forest cover on stream flow, and the extent and influence of forest cover are discussed. "The forests are influential in improving the potability of the Potomac water in 3 ways: They prevent greater erosion from certain soil types on steep slopes which are yet partly in forest and which wash badly when deforested, and lessen in this way the very high turbidity of the water. They maintain the volume,

already very low, of the summer and autumn run-off, which by dilution adds to the real purity of the water . . . They also steady and equalize the flow of the smaller streams and lessen the erosion of their banks." Forest types are listed in respect to their humus-forming capacity. Turbidity in reservoirs at Washington, D. C., is discussed, and turbidity records of the Washington water supply are given.

ASHE, W. W.

(3329)

SOIL EROSION AND FOREST COVER IN RELATION TO UTILIZATION OF WATER POWER, WITH SPECIAL REFERENCE TO THE SOUTHEAST. Engin. World 23: 73-75. August 1923.

The silting of reservoirs is discussed as "a condition produced very largely and in many cases entirely through exposure of the naked soil—the removal of the protective cover of forest, with its litter and humus." Such erosion need not take place; a reservoir site when developed should have such protection as will insure its permanence. A summary on surface conditions, rainfall, and amount of solid matter carried by streams in different sections of the United States is given.

(3330)

SPECIAL RELATIONS OF FOREST TO RIVERS IN THE UNITED STATES. U. S. Inland Waterways Comm. Prelim. Rept. 1908: 514-534. 1908.

Discusses varying influences of forests upon stream flow in six different river groups of the United States. The groups are: Rivers of the North-eastern States and the Great Lakes region; rivers of the Middle Atlantic coast region; rivers of the Appalachians; rivers flowing from the eastern and southern slopes of the Rocky Mountains; Sacramento and San Joaquin Rivers; and the Columbia River. Considerable data on erosion and siltation for each group are given.

AYRES, Q. C.

(3331)

DITCH DESIGN FOR PREVENTION OF SILT DEPOSIT. Abstract in Engin. News-Rec. 86: 647-648. April 14, 1921.

The purpose of this paper is to show that in the flow and sedimentation of drainage ditches there is a close relation between velocity, depth, and width, particularly at junctions and sharp breaks in grade, and if the velocity can be controlled at these critical points it is possible to eliminate much sedimentation with reduced maintenance cost.

BABB, C. C.

(3332)

THE SEDIMENT OF THE POTOMAC RIVER. Science 21: 342-343. June 23, 1893.

"The United States Geological Survey in May, 1891, established a gauging station on the Potomac River at Chain Bridge, D. C., for the measurement of the discharge of the river at that place." This article deals with the relation of the river discharge to rainfall in the basin, and resultant sedimentation.

BAKHMETEFF, BORIS A.

(3333)

HYDRAULICS OF OPEN CHANNELS. 329 pp., illus. New York, McGraw-Hill Book Co. 1932.

"The present book is an attempt to supply the need, at least in part, and to offer a manual presenting the subject of varied flow in a manner which makes it useful for engineering practice and design." Divided into three parts: The Theory of Gradually Varied Flow; Practical Applications; and The Hydraulic Jump.

BALLESTER, R. E., and LACEY, GERALD.

(3334)

STABLE CHANNELS IN ERODIBLE MATERIAL. Amer. Soc. Civ. Engin. Proc. 62: 773-779. May 1936.

Discussion of a paper by E. W. Lane published in proceedings for November 1935. Contains additional data obtained from observations in the Rio Negro, Argentina, on channel silting and silt transport.

BARBER, SOLON R.

(3335)

PARTY "SHOOTS" COLORADO RIVER GORGE FOR SILTING AND EROSION INFORMATION. Soil Conserv. 1: 6-9, 14, illus. May 1936.

An account of Soil Conservation Service survey along 55 miles of Lower Granite Gorge of the Colorado River. Preliminary reports show that the bulk of the silt washed into Boulder Reservoir comes from a relatively

small area of watershed and that it has been blown or washed down into the river from the high plateau watersheds in the Navajo Indian Reservation in northeastern Arizona and the Ute Indian country in northwestern New Mexico.

BARNES, FARRELL F. (3336)

ADVANCE REPORT ON THE SEDIMENTATION SURVEY OF LAY RESERVOIR, CLANTON, ALABAMA. U. S. Soil Conserv. Serv. SCS-SS-13, 13 pp., illus. 1937. [Mimeographed.]

Original storage capacity at crest level, 156,525 acre-feet; present capacity, 138,520 acre-feet; loss by siltation, 18,005 acre-feet. Reservoir built December 1913; survey made January 27-July 24, 1936.

BARNES, G. A. (3337)

SOIL CONSERVATION IN REGARD TO WATER SUPPLIES IN THE SOUTHWESTERN STATES. Southwest Water Works Jour. 18: 11-14, 28. August 1936.

Contains reports of silt surveys by Soil Conservation Service on nine reservoirs of Texas, Oklahoma, and Arkansas. Surveys of White Rock Reservoir and Lake Waco are given in detail. States that "examples cited . . . show that the reservoirs through the south-central states are filling at an alarming and excessive rate due to the widespread lack of erosion control measures in the watersheds."

BATES, C. G., AND HENRY, A. J. (3338)

FOREST AND STREAMFLOW EXPERIMENT AT WAGON WHEEL GAP, COLORADO. U. S. Monthly Weather Rev. (Sup. 30), 79 pp., illus. 1928.

This is the final report on the second phase of the experiment, of which the history and description are given. "The attempt made in this report is to present the data accumulated in 15 years of study in the simplest possible form for the comparison of the two periods, the first comprising the 8 years before watershed B was denuded and the second the 7 years subsequent."

BENNETT, H. H. (3339)

STUDIES ON SOILS WHICH BEAR ON SEDIMENTATION. Natl. Research Council, Reprint and Cir. Ser. 85: 80-83. 1928.

"This is a brief statement regarding the work of the Bureau of Chemistry and Soils of the United States Department of Agriculture, especially on soil erosion as related to sedimentation."—Expt. Sta. Rec. 60: 713. 1929.

— AND LOWDERMILK, W. C. (3340)

PRELIMINARY REPORT ON BENEFICIAL USES OF WATER RESOURCES, PRINCIPAL STREAMS OF THE UNITED STATES. 52 pp. March 19, 1934. [Mimeographed.]

"Herewith is a copy of a hastily prepared preliminary report which the Soil Erosion Service has submitted to the Subcommittee dealing with the Atlantic Seaboard Division set up under the Cabinet Council for the purpose of reporting upon the matter of beneficial uses of water. [It] includes brief outlines of the problem of accelerated erosion, runoff and silting of stream channels and reservoirs, in relation to all six of the divisions of the country considered by the six subcommittees . . ."

BERKEY, CHARLES PETER. (3341)

CRITICAL GEOLOGIC FEATURES OF THE HOOVER DAM SITE. Science 75: 545-546. May 20, 1932.

Brief review of the desirable features attached to the selection of the Hoover Dam site in comparison with other nearby locations. A disadvantage cited, however, is the heavy load of silt, tending by its accumulation in the reservoir to reduce its storage capacity.

BEFNARD, M. M. (3342)

AN APPROACH TO DETERMINATE STREAM FLOW. Amer. Soc. Civ. Engin. 60: 2-18. January 1934.

The purpose of this paper is to indicate the possibility of stream-flow studies through the use of published Weather Bureau and Geological Survey data, ". . . by which regional coefficients may be developed and made

available for use." Discussions on this paper are contained in subsequent proceedings under the following authors: C. S. Jarvis, 60: 436-438, March 1934; L. K. Sherman, 60: 585-588, April 1934; W. W. Horner, 60: 764-765, May 1934; C. H. Eiffert and C. S. Bennett, 60: 1037-1039, September 1934; R. L. Gregory and C. E. Arnold, 60: 1340-1351, November 1934.

- BISSELL, C. A. (3343)
SILT CONDITIONS AT ELEPHANT BUTTE RESERVOIR. New Reclam. Era 21: 198-199. October 1930.

Discusses sources of silt and gives data on percentages of silt in suspension at San Marcial, Tex. The effect of the 1929 flood on siltation is also discussed.

- BLACKWELDER, ELIOT. (3344)
SEDIMENTATION STUDIES AT STANFORD UNIVERSITY. Natl. Research Council Bull. 89: 99-100. November 1932.

- BLANEY, H. F. (3345)
SILT TRANSPORTATION BY SACRAMENTO AND COLORADO RIVERS AND BY THE IMPERIAL CANAL. Amer. Soc. Civ. Engin. Proc. 56: 133-137. January 1930.

Discusses tables on mechanical analyses of suspended silt at various depths in the Colorado River at Yuma, Ariz., and in the canal at Hanlon, Calif.

- BOSTON SOCIETY OF CIVIL ENGINEERS. (3346)
PROGRESS REPORT OF COMMITTEE ON RUN-OFF. Boston Soc. Civ. Engin. Jour. 5: 387-422. November 1918.

This report discusses use of the current meter in stream gaging; 0.2 and 0.8 method in power canals; precipitation, evaporation and run-off; effects of ice on river discharge; and methods to be used in compilation of data. A glossary of terms is included.

- BOTTOMLEY, W. T. (3347)
NEW THEORY OF SILT AND SCOUR. Engineering [London] 125: 307-308, illus. March 16, 1928.

"The silt-transporting power of a current of water, according to the late Mr. P. A. M. Parker, is one of the least understood subjects in hydraulics." Considering the theories of various engineers the author says: "Several phenomena of silting and scouring can be understood when the effects of gradient are considered. For example, the general tendency of rivers carrying silt is for the gradient to be uniform throughout and equal to the average gradient between source and sink."

- BOWEN, EDWARD. (3348)
CALIFORNIA RESERVOIRS SILT UP SLOWLY. Engin. News-Rec. 79: 169-170, illus. July 26, 1917.

States that the Sweetwater, Lake Chabot, and La Grange Reservoirs show little capacity loss, the Sweetwater losing only 4 percent of capacity in 12 years, and the Lake Chabot 16½ percent in 36 years. Discusses a sedimentation survey of the La Grange Reservoir.

- BOWMAN, ISALAH. (3349)
CORRELATION OF SEDIMENTARY AND CLIMATIC RECORDS. Science 75: 594. June 3, 1932.

"The drought of the past three years has exposed lake floors that have been covered with water for many decades and that have been exposed to view probably not more than once or twice since white occupation of the West." The necessity of making sedimentation studies on dry lake beds before they again become covered with water is urged.

- BREAZEALE, J. F. (3350)
STUDY OF THE COLORADO RIVER SILT. Ariz. Agr. Expt. Sta. Tech Bull. 8, pp. 165-185. 1926.

This bulletin is the result of an extensive study of silt and soil in the Colorado River. The problem of silt in streams which supply irrigation water is emphasized.

BROWN, C. B.

(3351)

FROM FARM FIELDS TO CITY STREETS. Soil Conserv. 2: 189-190, 198, illus. March 1937.

Describes reclamation work in the Ohio Valley as a result of the 1937 flood. Outlines surveys being made to determine the amount of the sediment deposited by flood waters and gives preliminary estimates on flood acreage and amount of sediment within the boundaries of Wheeling and Huntington, W. Va., and Marietta, Portsmouth, and Cincinnati, Ohio.

(3352)

STUDIES OF RESERVOIR SILTING. Soil Conserv. 1: 1-5, 14, illus. May 1936.

"... reservoir surveys and related special studies are undertaken to determine present silting rates and predict future trends, so that we may be prepared to take steps necessary to lessen silting rates by recommending watersheds most needful of soil-conservation planning, and by developing methods for abating the silting rate supplementary to established erosion-control practices."

— and BARNES, FARRELL F.

(3353)

ADVANCE REPORT ON THE SEDIMENTATION INVESTIGATIONS OF RESERVOIRS AND NAVIGATION IMPROVEMENTS ON THE NEW RIVER, VIRGINIA AND WEST VIRGINIA. U. S. Soil Conserv. Serv. SCS-SS-6, 24 pp., illus. 1936. [Mimeographed.]

Summary of sedimentation in Fields Reservoir: Original storage capacity at crest level, 183.81 acre-feet; present capacity, 109.22 acre-feet; loss by siltation 74.59 acre-feet; dam was completed August 1930, survey made April 14-May 22, 1936. Summary of sedimentation in Washington Mills Reservoir: Original storage capacity at crest level, 2,954.24 acre-feet; present capacity 511.47 acre-feet; loss by siltation, 2,442.77 acre-feet; dam built November 1902; survey made April 14-May 22, 1936. Summary of sedimentation in Byllesby Reservoir: Original storage capacity at crest level, 8,892.16 acre-feet; present capacity, 3,538.35 acre-feet; loss by siltation, 5,353.81 acre-feet; dam built August 1912; survey made April 14-May 22, 1936. Summary of sedimentation in Buck Reservoir: Original storage capacity at crest level, 1,225.33 acre-feet; present capacity, 941.51 acre-feet; loss by siltation, 283.82 acre-feet; dam built August 1912; survey made April 14-May 22, 1936.

— and BARNES, FARRELL F.

(3354)

RESERVOIR SILTING IN THE NEW RIVER WATERSHED. Soil Conserv. 2: 95, 106, illus. November 1936.

This article treats of investigations of erosion conditions on the New River watershed by measurements of silting in the Washington Mills, Byllesby, and Buck Reservoirs in the New River watershed of Virginia. "A special feature was a study of the effect of one or more reservoirs on the silting rate of other reservoirs downstream." The authors point out that excessive silting greatly reduces storage capacity.

BROWN, MARK H.

(3355)

TRAVELING SOILS. Soil Conserv. 2: 252-253, 267-268, illus. May 1937.

Observations on flood damage in the Ohio Valley are reported. The result of sedimentation studies to investigate the condition of farm lands and urban areas in the flooded areas from Pittsburgh, Pa., to Cairo, Ill., are reviewed. Three factors were involved in these studies and were recorded on maps: "1. Estimated amount of deposit or removal. 2. Nature of deposits or estimated removals (fine sandy loam, silt, silty clay, etc.). 3. Land use or cover—clean-cultivated, pasture, weedy fields, timber, etc."

BROWN, R. M.

(3356)

THE MOVEMENT OF LOAD IN STREAMS OF VARIABLE FLOW. Amer. Geogr. Soc. Bull. 39: 147-158. 1907.

This article reviews the report of 1882, issued by the Mississippi River Commission, dealing with the movement of detritus, and discusses the regulation of low-water channels by confinement and by dredging. The location of deposits in a meandering river are also considered.

BRYAN, K.

(3357)

HISTORIC EVIDENCE ON CHANGES IN THE CHANNEL OF RIO PUERCO, A TRIBUTARY OF THE RIO GRANDE IN NEW MEXICO. Jour. Geol. 36: 265-282, illus. 1928.

"The Rio Puerco, a tributary of the Rio Grande in New Mexico, has deepened and widened its channel, or arroyo, since the settlement of the region. This process of accelerated erosion still continues. Historical evidence, largely the notes and maps of government land surveyors is cited to show that the cutting began between 1885 and 1890. The deepening of the arroyos has decreased the agricultural and grazing value of the country, resulting in the abandonment of six small towns and numerous ranches. The coincidence between the introduction of large numbers of stock and the cutting of arroyos indicates that overgrazing precipitated this form of destructive erosion. The ultimate cause, not completely discussed in this paper, appears to lie in cyclic fluctuations in climate."

BRYAN, KIRK.

(3358)

SILT STUDIES IN 1928 AND 1929. Natl. Research Council Reprint and Cir. Ser. 98: 27-29. 1931.

(3359)

SILTING OF RESERVOIRS, STUDIES BY ENGINEERS, WITH BIBLIOGRAPHY. Amer. Soc. Civ. Engin. Proc. 53 (Soc. Aff.): 129-133. March 1927.

Findings of studies conducted by various engineers on Elephant Butte Reservoir on the Rio Grande are here recorded.

— AND ROBINSON, H. F.

(3360)

EROSION AND SEDIMENTATION ON THE ZUÑI WATERSHED, NEW MEXICO. Amer. Geol. Soc. Bull. 39: 158-159. 1928.

The Zuñi Dam, built in 1904-7, created a reservoir having a capacity of 15,811 acre-feet. In the 22 years since 1906 wind and sand (silt) have entered the reservoir to the extent of 69 percent of its original capacity. "Most of the silt comes from the open valleys of a broad syncline of cretaceous rocks at the foot of the mountains. Here the production of rock waste has always been large, but it has since about 1880, been much accelerated by the erosion of a deep and everwidening channel or arroyo in the broad valley floors . . ." The rapid filling of Zuñi Reservoir was checked in 1923 by measures designed to control excessive erosion.

CHAPLINE, W. R.

(3361)

EROSION DARES THE WEST. Amer. Forests 37: 470-474, illus. August 1931. [Also in Sci. Amer. 146: 34-36. January 1932.]

"The silting of reservoirs and other irrigation works in the west is already seriously endangering established projects; and at the rate erosion is increasing, it is making prospective ones uncertain. The Zuni Reservoir in New Mexico . . . has in twenty-two years filled with erosion debris to over seventy percent of its capacity, practically destroying its usefulness." Similar examples in Utah and Idaho are described and illustrated.

CHRISTIANSEN, J. E.

(3362)

DISTRIBUTION OF SILT IN OPEN CHANNELS. Amer. Geophys. Union Trans. pt. 2, Ann. Meeting 16: 478-485. 1935.

This paper gives the results of a study conducted for the purpose of comparing observed silt distribution with Schmidt's theory.

CHURCH, J. E.

(3363)

PRINCIPLES OF SNOW SURVEYING AS APPLIED TO FORECASTING OF STREAM FLOW. Jour. Agr. Research 51: 97-130, illus. July 15, 1935.

A snow sampler devised for use on Mount Rose, Nev., to meet all conditions of mountain snow is described, and the relative value of different methods of forecasting is discussed. "The purpose of snow sampling is to obtain an inelastic standard of measuring snow. Notwithstanding its limitations, snow surveying is valuable in forecasting the minimum run-off from a watershed. Such is its purpose where the snow cover is regarded merely as a supplement to ground-water storage and summer rains."

- CLAXTON, P. (3364)
MEANDERINGS OF ALLUVIAL RIVERS GOVERNED BY A FIXED LAW. Engin. News-Rec. 99:268. August 18, 1927.
The author states that "movements and changes in amount of silt held in suspension are similar on streams flowing through alluvial plains." Several examples of alluvial river meanderings are cited.
- CODE, W. E. (3365)
WHEN MEASURING WATER, USE A PROVED ACCURATE DEVICE, PROPERLY INSTALLED AND OPERATED TO MAKE FAIR DIVISIONS. West. Farm. Life 38:6. June 1, 1936.
Recommends the Parshall measuring flume for ditch measurements of all ordinary flows. Describes also the best type of dividing box (the weir type) in which divisions are made at and below the crest.
- COFFEY, G. N. (3366)
AN EROSION STUDY. Jour. Amer. Soc. Agron. 5:230-232. October-December 1913.
Embodies a plan for measuring the amount of material that is removed in drainage waters from the surface of a given area. Experiment made at Wooster, Ohio.
- COMMONS, G. G. (3367)
BETTER FLOW FORMULAS. Engin. News-Rec. 117:726-727. November 19, 1936.
In a letter to the editor the writer suggests the means by which a rational formula for open channels might be obtained. He hopes to start discussions for real development in flow formulas.
- COOK, H. L. (3368)
OUTLINE OF THE ENERGETICS OF STREAM TRANSPORTATION OF SOLIDS. Amer. Geophys. Union Trans. pt. 2 Ann. Meeting 16: 456-467. 1935.
"The purpose of this paper is to indicate a line of attack on the problem of stream transportation of solids through consideration of energy relations. The treatment is brief and necessarily superficial in many respects. However, it is felt that this analysis will (a) show the real nature of the various difficult problems involved, (b) indicate possible methods of solution, and (c) afford a rational basis for the systematic interpretation of experimental results."
- COOPERRIDER, C. K., AND HENDRICKS, B. A. (3369)
SOIL EROSION AND STREAM FLOW ON RANGE AND FOREST LANDS OF THE UPPER RIO GRANDE WATERSHED IN RELATION TO LAND RESOURCES AND HUMAN WELFARE. U. S. Dept. Agr. Tech. Bull. 567, 88 pp., illus. 1937.
Partial contents: General description of the upper Rio Grande watershed; Land resources; Striking evidence of accelerated erosion; Destructive effects of accelerated runoff; Causes of deterioration of range and forest lands; Source of destructive flood waters and silt; Vegetation-erosion relationships; Soil erosion in relation to range values; The Colorado part of the watershed; Solution of the watershed problem; The immediate need.
Literature cited, pages 87-88.
- DAVIS, A. P. (3370)
MEASUREMENT OF SEDIMENT. U. S. Geol. Survey Water-Supply Paper 47: 15-18. 1901.
Discusses two methods of measuring the amount of sediment held in suspension by streams in Arizona. Necessary equipment is described.
- WATER STORAGE ON SALT RIVER, ARIZONA. U. S. Geol. Survey Water-Supply and Irrig. Paper 73, 54 pp., illus. 1903. (3371)
Describes character of drainage basin, water supply, and gives designs, specifications, and general data on methods of constructing the Salt River Reservoir. Figures on sedimentation in the river water are tabulated and discussed, pages 41-42.

- DEACON, G. F. (3372)
DISCUSSION ON TRAINING OF RIVERS. Inst. Civ. Engin. [London] Proc. 118: 93-96. 1894.
Describes the findings of an investigation on the transport of sand by running water, summarizing the results of a series of observations made in the estuary of the Mersey River in England. The velocity of the moving sand is the chief consideration.
- DOBSON, G. C. (3373)
A FORMULA FOR CAPACITIES OF RESERVOIRS. Soil Conserv. 1: 7-9. February 1936.
"The formula described in this article was developed specifically for computing original and present capacity and silt volumes in storage reservoirs."
- AND BROWN, CARL B. (3374)
INSTRUCTIONS FOR RESERVOIR SEDIMENTATION SURVEYS. U. S. Soil Conserv. Serv. SCS-SS-2, 37 pp., illus. 1936. [Mimeographed.]
Gives instructions on how to determine the volume and distribution of sediment accumulated in an original storage basin during a specific period of time. Two procedures are described—the range method and the contour method. Instructions are also given on the preparation of maps, illustrations, and supplemental material.
- DODGE, R. A., and THOMPSON, M. J. (3375)
FLUID MECHANICS. 495 pp., illus. New York and London, McGraw-Hill Book Co., Inc. 1937.
Deals with statics of fluids, accelerated liquids in relative equilibrium, dynamics of fluids, impulse and momentum in fluids, the flow of viscous fluids, thermodynamics of compressible viscous fluids, and special problems in fluid mechanics.
- DOWD, M. J. (3376)
HOW THE IMPERIAL IRRIGATION DISTRICT MEETS ITS PROBLEM OF SILT DEPOSITION AND EROSION. Engin. and Contract. 69: 436-438, illus. December 1930.
Experiments and results with culverts and drains are discussed.
- DUNN, H. H. (3377)
TEACHING THE MISSISSIPPI TO BRUSH ITS OWN TEETH. Pop. Mech. 32: 8-12, illus. July 1919.
"The Mississippi will be able to brush its own teeth and keep its own mouth clean of mud and silt and sand, which for so many generations have kept the government dredges and other boats busy down at Port Eads holding open that mouth so that ships might pass in and out . . ."
- EAKIN, H. M. (3378)
DIVERSITY OF CURRENT-DIRECTION AND LOAD-DISTRIBUTION ON STREAM—BENDS. Amer. Geophys. Union Trans. pt. 2, Ann. Meeting 16: 467-472, illus. 1935.
Presents data to show that the systematic divergency of current direction on stream bends is apparently indicated by the fact of superelevation of waters toward the outer bank of the bend. "Such cross-channel slopes would appear, necessarily, to impose a constant deflective force from surface to bed throughout each water column. Constant centrifugal resistance to this deflective force in cross-channel direction seems necessarily established by variation in paths of curvilinear motion distributed according to velocity-variations in the vertical column."
- (3379)
INFLUENCE OF DEFORESTATION UPON STREAM AND VALLEY RESOURCES. Jour. Forestry 34: 983-987. November 1936.
Previous studies and fluvial aspects of this problem are considered together with the influence of deforestation through accelerated erosion. "It is with regard to these fundamental problems of soil conservation that the present program of sedimentation and hydraulic studies of the Soil Conservation Service has been laid"

EAKIN, H. M.

(3380)

THE INFLUENCE OF THE EARTH'S ROTATION UPON THE LATERAL EROSION OF STREAMS. Jour. Geol. 18: 435-447. 1910.

Shows how the influence of the earth's rotation unbalances the lateral erosion of streams, in the Northern Hemisphere directing the stronger erosion on the right bank, and in the southern Hemisphere, on the left. States that the "deflective force" is much stronger in the higher latitudes. Data are compiled from observations made on Alaskan rivers and the Mississippi.

(3381)

MEETING THE MENACE OF OVERFLOW WATERS. Soil Conserv. 1: 5-6. January 1936.

"Comprehensive flood control includes not only the simple confinement and guidance of waters but control of erosion and the transportation and redistribution of sediment as well."

(3382)

SILTING OF RESERVOIRS. U. S. Dept. Agr. Tech. Bull. 524, 142 pp., illus. 1936.

Gives data on significant reservoirs in the southeastern, southern Great Plains, and southwestern type areas of the United States and shows that silting of reservoirs is an important problem in all three regions wherever accelerated erosion is present. Data are taken from previous investigations of 25 reservoirs and reconnaissance surveys conducted by the Soil Conservation Service in 1934-35.

(3383)

THE TWIN PROBLEM OF EROSION AND FLOOD-CONTROL. Reprinted from Amer. Geophys. Union Trans. Ann. Meeting 17: 436-439. 1936.

This paper deals with changes in water and sediment output from upland areas, and reduction of levee freeboard due to loss of overbank area.

EARGLE, D. HOYE.

(3384)

ADVANCE REPORT ON THE SEDIMENTATION SURVEY OF HIGH ROCK RESERVOIR, SALISBURY, NORTH CAROLINA. U. S. Soil Conserv. Serv. SCS-SS-10, 23 pp., illus. 1937. [Mimeographed.]

Original storage capacity at crest level, 289,432 acre-feet; present capacity, 275,516 acre-feet; loss by siltation, 13,916 acre-feet. Reservoir built November 1927, survey made May 18-October 25, 1935.

(3385)

ADVANCE REPORT ON THE SEDIMENTATION SURVEY OF LAKE HARRIS, TUSCALOOSA, ALABAMA. U. S. Soil Conserv. Serv. SCS-SS-4, 7 pp., illus. 1936. [Mimeographed.]

Original storage capacity at crest level, 2,421 acre-feet; present capacity, 2,373 acre-feet; loss by siltation, 48 acre-feet. Dam completed February 1929; survey made October 30-November 6, 1935.

(3386)

ADVANCE REPORT ON THE SEDIMENTATION SURVEY OF LAKE PURDY, BIRMINGHAM, ALABAMA. U. S. Soil Conserv. SCS-SS-5, 11 pp., illus. 1936. [Mimeographed.]

Original storage capacity at crest stage, 19,080 acre-feet; present capacity 18,594 acre-feet; loss by siltation, 486 acre-feet. Dam built September 1910 (raised 20 feet, June 1929); survey made November 6-28, 1935.

— AND BARNES, FARRELL F.

(3387)

ADVANCE REPORT ON THE SEDIMENTATION SURVEY OF BAYVIEW RESERVOIR, BIRMINGHAM, ALABAMA. U. S. Soil Conserv. Serv. SCS-SS-11, 12 pp., illus. 1937. [Mimeographed.]

Original storage capacity at crest stage, 11,866 acre-feet; present capacity, 9,514 acre-feet; loss by siltation, 2,352 acre-feet. Reservoir built May 1911; survey made November 30, 1935-January 25, 1936.

- EDWARDS, A. M. (3388)
SILTING OF THE O'SHAUGHNESSY RESERVOIR. Civ. Engin. 6: 511-512, illus. August 1936.
Some of the results of silt investigation and methods of conducting surveys are described dealing specifically with municipal sanitary engineering problems of water supply and refuse disposal in Columbus, Ohio.
- ELLIS, M. M. (3389)
EROSION SILT AS A FACTOR IN AQUATIC ENVIRONMENTS. Ecology 17: 29-42. January 1936.
The author discusses the penetration of colored light and the limits of visible light penetrations into waters carrying silt. Retention of organic matter and other material by erosion silt which produces high mortality among fresh-water mussels living in gravel and sand beds is also pointed out.
- ELLISON, W. D. (3390)
MEASURING EQUIPMENT USED IN WATERSHED AND HYDROLOGIC STUDIES. Agr. Engin. 18: 107-110. March 1937.
"The watershed and hydrologic studies project of the U. S. D. A. Soil Conservation Service was established at Coshocton, Ohio, in November 1935. Since that date engineers (agricultural and hydraulic), soil scientists, foresters, geologists, and meteorologists have been studying the watersheds of this area, planning a program of research, and designing and installing equipment for scientific studies." Work at Coshocton is described.
- FAIR, GORDON M., AND HATCH, LORANUS, P. (3391)
FUNDAMENTAL FACTORS GOVERNING THE STREAM-LINE FLOW OF WATER THROUGH SAND. Jour. Amer. Water Works Assoc. 25: 1551-1565, illus. November 1933.
Technical data on the subject are presented in the form of equations and formulas. Factors treated are the area-volume ratio of sand, unstratified filter beds, expanded filter bed, etc. A discussion of the data concludes the article.
- FAIRCHILD, HERMAN L. (3392)
EARTH ROTATION AND RIVER EROSION. Science 76: 422-427, illus. November 11, 1932.
The suggestion that the right-hand deflection of moving bodies might produce excessive erosion of the right banks of the rivers is discussed.
- FARIS, ORVILLE A. (3393)
THE SILT LOAD OF TEXAS STREAMS. U. S. Dept. Agr. Tech. Bull. 382, 70 pp., illus. 1933.
This is a detailed study of silt deposition conducted at various points along the Brazos River and reservoirs in Texas. A description is given of plans and methods of study, sampling equipment, method of sampling, and laboratory methods. Discusses bed silt, velocity and silt percentage curves, comparisons of discharge and silt percentage, mechanical analyses of suspended silt, determination of the silt load, and prevention of silting.
Literature cited, pages 56-57.
- FINKLE, F. C. (3394)
THE COLORADO RIVER SILT PROBLEM, THE DREDGE "IMPERIAL" AND IRRIGATION IN IMPERIAL VALLEY, COLO. Engin. News 66: 695-699, illus. December 14, 1911.
Describes the function and operation of the hydraulic dredge *Imperial*. Plans, designs, and specification for construction are given with itemized costs, totaling \$63,589.93.
- FROCK, L. R. (3395)
RECORDS OF SILT CARRIED BY THE RIO GRANDE AND ITS ACCUMULATION IN ELEPHANT BUTTE RESERVOIR. Amer. Geophys. Union Trans. Ann. Meeting 15: 468-473. 1934.
"Silt in the flow of the Rio Grande has been under observation, and records of the amount carried are available for a longer continuous period than for any other southwest stream . . . Values for the net dry weight of a cubic foot of deposited silt have been determined or assumed for use in

the computations of the volume of silt carried by the Rio Grande ranging all the way from 50 to 100 pounds . . . Two reservoir silt-surveys have been conducted, one in 1920 and another in 1925." The results of these surveys are given, and conditions productive of a silt flow through the reservoir are discussed.

FISON, DAVID.

(3396)

THE MANNER OF FLOW OF A RIVER IN FLOOD.—II. Jour. Inst. Engin. Aust. 8: 161-168. May 1936.

With the aid of diagrams, tables, and equations a method of delineating flood flow is illustrated, which enables the behavior of the flood waters to be studied in accurate detail.

FLYNN, B. H., AND FLYNN, M. S.

(3397)

THE NATURAL FEATURES AND ECONOMIC DEVELOPMENT OF THE SANDUSKY, MAUMEE, MUSKINGUM, AND MIAMI DRAINAGE AREAS IN OHIO. U. S. Geol. Survey Water-Supply and Irrig. Paper 91, 130 pp., illus. 1904.

"This paper treats of the natural features and development of the areas drained by the Maumee, Sandusky, Miami, and Muskingum Rivers and contains valuable data with reference to the flow of these streams and the natural advantages they offer with reference to water power and domestic water supply."

FOLLANSBEE, R., AND SPIEGEL, J. B.

(3398)

FLOOD ON REPUBLICAN AND KANSAS RIVERS, MAY AND JUNE 1935. U. S. Geol. Survey Water-Supply Paper 796-B, 52 pp., illus. 1937.

Data on rainfall, topography of the river basin, flood discharges, and daily discharge at gaging stations are included.

FOLLETT, W. W.

(3399)

SILT IN THE RIO GRANDE. Internatl. Boundary Comn. for the Equitable Distribution of the Waters of the Rio Grande, United States and Mexico. 102 pp. 1913.

"The following compilation and discussion of the silt determinations of Rio Grande waters made prior to January 1, 1913, is for the purpose of putting into tangible and accessible shape the information which is now hidden away in filing cases and record books." In conclusion the writer says: "The fact brought out most prominently by this study is that no hard and fast rule, not even an approximate one, can be made as to what silt the river will carry in future years . . . It is also shown that the silt is a factor which must be seriously considered in the building of any reservoir on the Rio Grande."

(3400)

SILT IN THE RIO GRANDE. Engin. News 71: 18-21. January 1, 1914.

Gives a brief historical outline of silt determination experiments which were begun in 1889 and continued with little interruption till 1912. Considerable data are given on determination of the weight of a cubic foot of silt, sediment movement on bottom of river, and stream flow.

FORBES, R. H.

(3401)

IRRIGATING SEDIMENTS AND THEIR EFFECTS UPON CROPS. Ariz. Agr. Expt. Sta. Bull. 53: 59-98, illus. 1906.

"The writer began an inquiry into the relations between irrigating sediments and farm crops, giving particular attention to the effects upon crops of mine tailings which, finding their way into the Gila River from concentrating plants upstream, are carried down upon irrigated lands below . . . The fertilizing and physical effects of sediments upon soils are discussed in this bulletin . . . Unusual pains have been taken to present an accurate, impartial and systematic statement of facts relating to the subject of this bulletin."

FORTIER, SAMUEL. AND BLANEY, HARRY F.

(3402)

SILT IN THE COLORADO RIVER AND ITS RELATION TO IRRIGATION. U. S. Dept. Agr. Tech. Bull. 67, 95 pp., illus. 1928.

This study on siltation in the lower Colorado River Basin has a twofold purpose, one being to aid the irrigators of the lower basin in the better control of silt, and the other to pave the way for a more complete control of silt by means of storage reservoirs in the middle and upper sections of the Colorado River system.

FRASER, HORACE J.

(3403)

SAMPLING INCOHERENT SANDS FOR POROSITY DETERMINATIONS. *Amer. Jour. Sci.* (5) 22: 9-17. July 1931.

"In the following paper two methods are presented whereby it is possible to obtain an undisturbed and representative sample of an incoherent sediment in its natural condition; and methods whereby from these samples precise determinations may be made of the porosity, apparent specific gravity or lump density of the sample and the actual specific gravity of the component grains."

FREE, E. E.

(3404)

POSSIBLE ERROR IN THE ESTIMATES OF THE RATE OF GEOLOGICAL DENUDATION. *Science* (n. s.) 29: 423-424. March 12, 1909.

"The thorough figures of Dole and Stabler are deduced . . . from the examination of river waters, and are based upon the assumption that all material which is removed from the land to the sea is carried in suspension or solution by outward-flowing water. Recent studies of the magnitude of aeolian transport cast some doubt upon the validity of this assumption . . . Udden has calculated on very conservative data, that the transport capacity of the winds blowing outward from the Mississippi Basin is at least one thousand times greater than that of the river . . ." The writer believes that the present estimates of the rapidity of denudation are far too low.

GANNETT, FARLEY.

(3405)

WHAT STREAM GAGINGS INDICATE AS TO THE RUNOFF FROM FORESTED AND BARREN AREAS. *Engin. News* 63: 759-760. June 30, 1910.

In a letter to the editor the writer states that his knowledge of stream-flow records contains no proof that forests materially influence stream flow. Various generally accepted theories on this subject are discussed, and evidence is presented.

GILBERT, G. K.

(3406)

TRANSPORTATION OF DEBRIS BY RUNNING WATER. *U. S. Geol. Survey Prof. Paper* 86, 236 p., illus. 1914.

"The experiments described in this report were . . . instigated by the common needs of physiographic geology and hydraulic engineering. A laboratory was established at Berkeley, Cal., and the investigation became the guest of the University of California." This report considers scope and method, the slope, discharge, fineness, and form factors, velocity, mixtures, modes of transportation—movement of particles, collective movement, application of formulas, load versus energy, flume transportation, vertical velocity curve, and pitot tube.

GLENN, L. G.

(3407)

TENNESSEE RIVER IMPROVEMENT AND SEDIMENTATION. *Amer. Forests* 16: 419-422. July 1910.

This paper is a reply to the testimony of Capt. Edward N. Johnston, United States Army, before the House Committee on Agriculture on March 2, 1910, when considering the Weeks bill. The writer several times gave testimony as to the harmful effect the material eroded from the steep headwater mountain slopes of the Tennessee River Basin had on the navigable portion of that stream.

GLYPH, LOUIS M., AND JONES, VICTOR H.

(3408)

ADVANCED REPORT ON THE SEDIMENTATION SURVEY OF LAKE BENNETT, CONWAY, ARKANSAS. *U. S. Soil Conserv. Serv. SCS-SS-9*, 5 pp., illus. 1936. [Mimeographed.]

Original storage capacity at crest level, 492 acre-feet; present capacity, 488 acre-feet; loss by siltation, 4 acre-feet. Dam completed, June 1935; survey made November 2-22, 1935.

— AND JONES, VICTOR H.

(3409)

ADVANCE REPORT ON THE SEDIMENTATION SURVEY OF LAKE BOONEVILLE, BOONEVILLE, ARKANSAS. *U. S. Conserv. Serv. SCS-SS-3*, 7 pp., illus. 1936. [Mimeographed.]

Original storage capacity at crest stage, 289.45 acre-feet; present capacity, 281.57 acre-feet; loss by siltation, 7.88 acre-feet. Water storage began in March 1929; survey made November 22-December 4, 1925.

GLYMPH, LOUIS M., AND JONES, VICTOR H. (3410)

ADVANCE REPORT ON THE SEDIMENTATION SURVEY OF LAKE CALHOUN, GALVA, ILLINOIS. U. S. Soil Conserv. Serv. SCS-SS-16, 9 pp., illus. 1937. [Mimeographed.]

Original storage capacity at crest level, 286 acre-feet; present capacity, 137 acre-feet; loss by siltation, 149 acre-feet. Dam built September 1924; survey made July 23-August 6, 1936.

— AND JONES, VICTOR H. (3411)

ADVANCE REPORT ON THE SEDIMENTATION SURVEY OF LAKE DECATUR, DECATUR, ILLINOIS. U. S. Soil Conserv. Serv. SCS-SS-12, 23 pp., illus. 1937. [Mimeographed.]

Original storage capacity at crest stage, 19,738 acre-feet; present capacity, 16,930 acre-feet; loss by siltation, 2,808 acre-feet. Dam built April 1922; survey made April 8-July 3, 1936.

— AND JONES, VICTOR H. (3412)

ADVANCE REPORT ON THE SEDIMENTATION SURVEY OF LAKE SAPULPA, SAPULPA, OKLAHOMA. U. S. Soil Conserv. Serv. SCS-SS-7, 9 pp., illus. 1936. [Mimeographed.]

Original storage capacity at crest level, 1,094 acre-feet; present capacity, 911 acre-feet; loss by siltation, 183 acre-feet. Dam built 1913, survey made December 5, 1935-January 10, 1936.

GRIFFITH, W. M. (3413)

THEORY OF SILT AND SCOUR. Engineering [London] 123: 72. January 21, 1937.

In discussing R. G. Kennedy's general law the author points out that the power of a stream to transport silt in suspension is derived from vertical eddies. Outlining his formula he says: "The application of this theory is made to the design of bridge-foundations and finally to river-training works. The theory is also advanced that there is a particular width of river which will give the minimum of shoaling or scour action under varying flood-volumes."

GROVER, N. C. (3414)

UNITED STATES GEOLOGICAL SURVEY RECORDS OF SUSPENDED AND DISSOLVED MATTER IN SURFACE-WATERS. Amer. Geophys. Union Trans. pt. 2, Ann. Meeting 17: 444-446. 1936.

Reviews the work of the Geological Survey in measuring discharge and suspended matter in American rivers since 1902, and tells why the survey was allotted funds in January 1934, primarily for the establishment and operation of stream-flow-measurement stations and for obtaining records of movement of suspended matter at eight erosion-control projects.

— FOLLANSBEE, ROBERT, JACOB, C. C., PURTON, A. B., AND ELLSWORTH, C. E. (3415)

SURFACE WATER SUPPLY OF THE UNITED STATES 1918, PART IX. COLORADO RIVER BASIN. U. S. Geol. Survey Water-Supply Paper 479, 189 pp., illus. 1922.

In this report the data collected at various gaging stations consist of records of stage, measurements of discharge, and general information used to supplement the gage heights and discharge measurements in determining the daily flow.

— AND HOWARD, C. S. (3416)

THE PASSAGE OF TURBID WATER THROUGH LAKE MEAD. Amer. Soc. Civ. Engin. Proc. 63 (pt. 1): 643-655, illus. April 1937.

A record and description of silt flow from Lake Mead above Boulder Dam from March 1 to October 31, 1935. "Turbid water carrying a considerable load of fine silt was discharged from Lake Mead, above Boulder Dam, in Arizona and Nevada, at three different periods during 1935 when the reservoir was 70 to 90 miles long and contained from 4,000,000 to 5,000,000 acre-feet of water. Apparently, it flowed through the reservoir essentially unmixed. Chemical analyses of the water entering into, and discharged from, the reservoir corroborate the conclusions drawn from the observations of silt as to the occasional discharge of essentially unmixed water. The phe-

nomenon is ascribed to the greater specific gravity of the incoming water relative to the generally clear water at the surface of the lake, due probably, in part, to its silt load. A practical significance is suggested with respect to the possibility of increasing the passage of fine silt through a reservoir, thereby prolonging its effective life. References are made to other known occurrences of similar phenomena."

GROVER, N. C., AND OTHERS.

(3417)

SURFACE WATER SUPPLY OF THE UNITED STATES, 1935. U. S. Geol. Water-Supply Papers 781-794. Washington, D. C. 1937.

These water-supply papers comprise a series of reports on stream-flow measurements in the United States during the year ended September 30, 1935. There are 14 parts in the series. Each part presents data on daily, monthly, and yearly gage heights and rates of discharge and run-off for a distinct river basin or basins. They are as follows: Part 1—North Atlantic Slope Basins, Paper 781, 421 pages; part 2—South Atlantic Slope and Eastern Gulf of Mexico Basins, Paper 782, 233 pages; part 3—Ohio River Basin, Paper 783, 400 pages; part 4—St. Lawrence River Basin, Paper 784, 170 pages; part 5—Hudson Bay and Upper Mississippi River Basins, Paper 785, 283 pages; part 6—Missouri River Basin, Paper 786, 353 pages; part 7—Lower Mississippi River Basin, Paper 787, 150 pages; part 8—Western Gulf of Mexico Basins, Paper 788, 197 pages; part 9—Colorado River Basin, Paper 789, 174 pages; part 10—The Great Basin, Paper 790, 94 pages; part 11—Pacific Slope Basins in California, Paper 791, 361 pages; part 12—Pacific Slope Basins in Washington and Upper Columbia River Basins, Paper 792, 166 pages; part 13—Snake River Basin, Paper 793, 197 pages; part 14—Pacific Slope Basins in Oregon and Lower Columbia River Basin, Paper 794, 167 pages. A series of water-supply reports on the same basins as listed above for the year ending September 30, 1936, is being prepared. Those published to date are: Part 4—St. Lawrence River Basin, Paper 804, 160 pages; part 7—Lower Mississippi River Basin, Paper 807, 149 pages; part 8—Western Gulf of New Mexico, Paper 808, 282 pages; part 9—Colorado River Basin, Paper 809, 187 pages; part 11—Pacific Slope Basins in California, Paper 811, 331 pages; part 12—Pacific Slope Basins in Washington and Upper Columbia River Basins, Paper 812, 161 pages; part 13—Snake River Basin, Paper 813, 242 pages; and part 14—Pacific Slope Basins in Oregon and Lower Columbia River Basin, Paper 814, 186 pages.

HAAN, J. H. DE.

(3418)

STREAM FLOW AND EROSION IN THE ALPS AND JAVA. *Tectona* 29: 559-588, illus. July-August 1936.

"The factors which influence streamflow and erosion on Java are quite different from those in the Alps . . . In general we may expect that the soil cover in the tropics has a greater effect on streamflow and erosion than in the Alps."

HAPP, STAFFORD C.

(3419)

FERTILE VALLEYS LAID WASTE BY UPLAND EROSION. *Soil Conserv.* 2: 194-198, illus. March 1937.

"The Soil Conservation Service is concerned with stream and valley sedimentation, both as a down-stream effect of accelerated upland erosion, and because of the direct damage to major valley soils." Data are given on the Wells drainage district in Lafayette County, Miss. "The history of the Wells district emphasizes the futility of attempting control of drainage and sedimentation problems without consideration of the upland erosion which is the fundamental cause . . . Thus, there is need and opportunity for improvement of the valleys, by some direct attention to the problems and processes of stream transportation and sedimentation."

HARISBERGER, JOHN.

(3420)

SOLIDS A PROBLEM AT POWER PLANTS IN NORTHWEST. *Engin. Rec.* 74: 290-291, illus. September 2, 1916.

Shows how gravel, sand, and silt in streams originating in glaciers must be handled effectively to obtain satisfactory results. Discusses methods of disposing of gravel in the supply canal and shows how the location of settling basins is important.

- HARPER, H. J., AND MURPHY, H. F. (3421)
A STUDY OF THE AMOUNT OF SEDIMENT CARRIED BY RUNOFF WATER. Okla. Acad. Sci. Proc. 10: 114-117. 1930.

"As a result of the interest which has been developed in soil conservation many interesting statements have been made in regard to the rate of soil losses . . ." Relative data are presented in tabular form.

Literature cited, page 117.

- HARRINGTON, ARTHUR W. (3422)
RAINFALL AND STREAM FLOW CONDITIONS DURING FLOODS IN CENTRAL AND SOUTHERN NEW YORK. Jour. Amer. Waterworks Assoc. 28: 1-5. January 1936.

Data on rainfall and run-off due to a series of thunderstorms of July 7 and 8, 1935, centered in area of 7,000 square miles in central and southern New York. Flood flows and inadequate gaging stations are also discussed.

- HARRIS, E. G. (3423)
EFFECT OF DAMS AND LIKE OBSTRUCTIONS ON SILT-BEARING STREAMS. Engin. News 46: 110-111, illus. August 15, 1901.

For the purpose of this study the author has divided streams into two classes: "(1) Those flowing by and over material that the water cannot cut away (as rock) . . . (2) streams flowing through material that can be cut away by moving water, as the alluvium, or 'bottom land.'" The need for a better understanding of this subject is stressed. "It is of vital importance to agriculture along such streams, and it should be used with good effect in reaching decisions in suits for damage resulting from the erection of milldams and the like."

- HEMPHILL, R. G. (3424)
SILTING AND LIFE OF SOUTHWESTERN RESERVOIRS. Amer. Soc. Civ. Engin. Trans. 95 (Paper No. 1784): 1060-1073. 1931.

This paper refers to the silt load of several of the principal streams of the Southwest to indicate the importance of the silt problem in that region and the necessity for a comprehensive study of it to meet adequately water-storage problems of the future.

- HILL, L. C. (3425)
SOLVING THE SILT PROBLEM. Engin. Rec. 70: 609-610. December 5, 1914.

Reservoirs are suggested for muddy streams of the Southwest. "A number of causes could materially reduce the quantity of silt carried by the Colorado below the canyon, chief among which are control of flood waters, resulting in more uniform flow in the lower river; more extended use of water for irrigation, both on the tributaries and on the main stream, and a regulated, permanent channel."

- HOLMQUIST, F. N. (3426)
BEHAVIOR OF DEBRIS-CARRYING RIVERS IN FLOOD. Engin. News-Rec. 94: 362-365, illus. February 26, 1925.

- HOOKE, E. H. (3427)
THE SUSPENSION OF SOLIDS IN FLOWING WATER. Amer. Soc. Civ. Engin. Trans. 36: 239-324. 1896.

"Considerable space in this paper is devoted to the historical side of the subject because the sources of information are widely scattered, and it is desired to indicate, so far as possible, the origin of the ideas and observation upon sedimentary movements which have become common knowledge. In the second part of the paper a comparison of particular facts and observations leads to certain general conclusions with reference to the manifestation of the phenomena studied. The concluding portion is devoted to an analysis of the different explanations of the causes of suspension, for the purpose of building up a satisfactory theory."

- HOWARD, C. S. (3428)
SUSPENDED MATTER IN THE COLORADO RIVER IN 1925-1928. U. S. Geol. Survey Water-Supply Paper 636: 15-44, illus. 1930.

"The quantity of suspended matter carried by the Colorado River varies considerably from year to year, and the uncertainty of its effect on the

life of reservoirs is shown by the estimates given above. The differences in the quantities carried at different stations during a 3-year period are shown in the results given in this paper."

HOWARD, C. S.

(3429)

SUSPENDED MATTER IN THE COLORADO RIVER, 1925-1935. Amer. Geophys. Union Trans. pt. 2, Ann. Meeting 17: 446-447. 1936.

In connection with the operation of regional projects of the Soil Conservation Service, it was desired to obtain records of the quantities of water and suspended matter carried out of the drainage basins in which erosion-control work was to be done and the quantities carried out of similar drainage basins on which the control methods were not used. This paper gives data on discharge and suspended matter for the Colorado River at the Grand Canyon gaging station.

HOYT, W. G., AND OTHERS.

(3430)

FORESTS AND STREAM FLOW. Amer. Soc. Civ. Engin. Trans. 99 (Paper 1858): 1-111. 1934.

The effects of change in vegetable cover on stream-flow characteristics are discussed in this paper and conclusions presented.

HUNTER, J. F.

(3431)

EROSION AND SEDIMENTATION IN CHESAPEAKE BAY AROUND MOUTH OF CHOPTANK RIVER. U. S. Geol. Survey Prof. Paper 90: 7-15, illus. 1914.

"Owing to the great mechanical labor and the long time necessary for such an investigation, the writer has contented himself with the study of a very small test area on the eastern shore of the bay around the mouth of the Choptank River . . . This small area affords an excellent opportunity to establish certain local rates of erosion and sedimentation, but of course gives no data for many of the larger and more general conclusions that would be expected from a study of the entire bay." The quantitative results of the study are presented in tabular form.

INGLIS, C. C.

(3432)

NOTE OF MAY 1931 ON SILT EXCLUSION FROM CANALS, "STILL POND" VERSUS "OPEN FLOW." Bombay Presidency [Pub. Works Dept.] Tech. Paper 45, 7 pp. illus. 1933.

Two methods of excluding heavy bed silt from off-takes are described and compared. The open flow method is defined as ". . . the partial opening of a few undersluice gates near the bed at the side of the approach channel farthest from the Canal off-take, near the divide wall—with the idea of drawing bed silt away from the Canal face." The still-pond method is keeping the undersluices closed while the canal is flowing, the velocity in the approach channel thus being kept down to such a low velocity that silt is deposited in the approach channel. When the deposit becomes considerable the canal is closed and the undersluices opened to scour out the silt.

IOWA ENGINEERING SOCIETY.

(3433)

PROCEEDINGS . . . Iowa Engin. Soc. Proc. 35, 118 pp., illus. 1923.

"At this meeting held at Des Moines, Iowa, January 23-26, 1923, the following special reports, among other features, were presented: Rainfall and the Run-off from some Iowa Drainage Districts, by W. J. Schlick; Drainage Assessments against Highways and Railroads, by W. H. Root; Highway Drainage, by J. L. Parsons; Iowa Highway Transportation Problems and Suggested Solution, by C. C. Corykendall; and Experiments on Nebraska Pit-run Gravels, by W. H. Campen."—Expt. Sta. Rec. 50: 516. 1924.

IOWA STATE PLANNING BOARD.

(3434)

STREAM FLOW RECORDS OF IOWA: 1873-1932. U. S. Geol. Survey and Iowa Inst. Hydraulic Research, 567 pp., illus. 1935. [Lithographed.]

"This report has been compiled to provide for ready reference and use the available records of flow of Iowa streams. It contains . . . substantially all such records collected by either public or private agencies up to and including December 1932."

- IRWIN, G. M. (3435)
WATERSHED PROTECTION AND CONTROL. Jour. Amer. Waterworks Assoc. 28: 1075-1089. August 1936.

Discusses sanitary regulations governing watersheds, citing the Province of British Columbia Health Act; comments on a paper by Hoyt and Troxell on forests and stream flow; outlines the investigations of the United States Forest Service in stream-flow measurements and discusses their findings in erosion research in southern California and southern Colorado. The opinions of Federal engineers on stream flow and its relation to forests are given.

- JAGGAR, T. A., JR. (3436)
EXPERIMENTS ILLUSTRATING EROSION AND SEDIMENTATION. Harvard Univ., Mus. Compar. Zool. Bull. 49: 285-305, illus. March 1908.

Table of contents: Catchment Basins and Water-bearing Strata; Imitative Character of Rills; Purpose of Experiments; Previous Studies of Rill Drainage; Seepage Rills; Underground Drainage Areas and Stream Shadow; Flood Rills; "Grand Canyon" Model; Trickle Pattern in Clay; Models Sprayed with Atomizers; Stream-Robbery Model; Discussion of Principles; Bibliography; Explanation of Plates. "The present study deals with a series of experiments designed to perfect apparatus for reproducing rill patterns in the laboratory. In the later of these experiments some success was attained, and meanders, piracy, digitation, corrosion, aggradation, and delta building have been reproduced in miniature. Some account is here given of these experiments, which have been carried on from time to time in the Harvard laboratory for eight years. In addition, the author's last models are described in detail, as they illustrate the argument outlined."

- JARVIS, C. S. (3437)
FLOOD FLOW CHARACTERISTICS. Amer. Soc. Civ. Engin. Trans. 89: 985-1032. 1926.

This paper presented at the meeting, May 6, 1925, shows characteristics of flood flow with data that may have either general or special application for protecting a given locality.

- GENERAL FORMULA FOR WATERWAYS. Pub. Roads 6: 253-259. February 1926. (3438)

"In the course of his work in connection with the design of structures on Federal-aid road projects the writer has been impressed by the radical revisions required in waterways proportioned in accordance with the best available data and formulas . . . In the hope of deriving a new expression capable of expansion to cover the entire range of watershed areas and conditions, he determined to plot on a single chart the best obtainable records of flood flows in relation to the area drained to ascertain the relation of the various common expressions to the data thus charted, and, if these were found to be lacking in agreement, to develop, if possible, a new and more adequate expression."

- JOACHIM, A. W. R., AND PANDITTESOKERE, D. G. (3439)
A SOIL EROSION INVESTIGATION. Trop. Agr. [Ceylon] 74: 200-203. April 1930.

An investigation of a preliminary nature to determine the amounts of silt carried in the water of a Ceylon river at different seasons of the year, begun in August 1929, is described. In a table are shown the results of the total solid determinations on the surface and 2-foot depth samples, respectively, the surface velocity measurements, and the rainfall in the catchment areas on the 2 days prior to sampling and on the date of sampling.

- JOHNSON, DOUGLAS W. (3440)
STREAM SCULPTURE ON THE ATLANTIC SLOPE; A STUDY IN THE EVOLUTION OF APPALACHIAN RIVERS. 142 pp., illus. New York, Columbia Univ. Press. 1931.

"The pages which follow first review some established principles of Appalachian geomorphology, and then briefly set forth the theory of regional superposition with the aid of nine block diagrams showing successive stages in the physical history of the eastern United States. There

are next presented a variety of considerations which seem strongly to support the new theory, and to a critical analysis of some current views on Appalachian history which must be superseded in case the theory be adopted. In connection with this part of the work there are offered for consideration new interpretations of the drainage evolution of eastern Pennsylvania and northern New Jersey."

JOHNSON, HOLLISTER. (3441)

THE NEW YORK STATE FLOOD OF JULY, 1935. U. S. Geol. Survey Water Supply Paper 773-E: 233-268, illus. 1936.

Presents data on rainfall and run-off and their effect on the flood. Also gives figures on flood discharges of streams in New York State.

JONES, L. A., SCHLICK, W. J., AND RAMSER, C. E. (3442)

A REPORT ON THE METHODS AND COST OF RECLAIMING THE OVERFLOWED LANDS ALONG THE BIG BLACK RIVER, MISS. U. S. Dept. Agr. Bull. 181, 39 pp., illus. 1915.

This report describes conditions, drainage problems, and plans of drainage. Considerable tabular data on run-off are given.

JONES, VICTOR H. (3443)

ADVANCE REPORT ON THE SEDIMENTATION SURVEY OF LAKE BRACKEN, GALESBURG, ILLINOIS. U. S. Soil Conserv. Serv. SCS-SS-14, 10 pp., illus. 1937. [Mimeographed.]

Original storage capacity at crest stage, 2,881 acre-feet; present capacity, 2,660 acre-feet; loss by siltation, 221 acre-feet. Dam built December 1923; survey made July 9-August 15, 1936.

(3444)

ADVANCE REPORT ON THE SEDIMENTATION SURVEY OF WEST FRANKFORT RESERVOIR, WEST FRANKFORT, ILLINOIS. U. S. Soil Conserv. Serv. SCS-SS-15, 9 pp., illus. 1937. [Mimeographed.]

Original storage capacity at crest level, 1,175 acre-feet; present capacity, 1,080 acre-feet; loss by siltation, 95 acre-feet. Reservoir built August 1926; survey made August 19-September 12, 1936.

KESLER, T. L. (3445)

ADVANCE REPORT ON THE SEDIMENTATION SURVEY OF LAKE SPAVINAW, SPAVINAW, OKLAHOMA. U. S. Soil Conserv. Serv. SCS-SS-1, 5 pp., illus. 1936. [Mimeographed.]

Original storage capacity at crest stage, 31,686 acre-feet; present capacity, 30,509 acre-feet; loss due to siltation, 1,177 acre-feet; dam built, April 1924; survey made, June 18-July 20, 1935.

(3444)

ADVANCE REPORT ON THE SEDIMENTATION SURVEY OF LAKE TANEY COMO, TANEY COUNTY, MISSOURI. U. S. Soil Conserv. Serv. SCS-SS-8, 8 pp., illus. 1936. [Mimeographed.]

Original storage capacity at crest level, 43,980 acre-feet; present capacity, 23,714 acre-feet, loss by siltation, 20,266 acre-feet. Dam built March 1913; survey made July 23-November 2, 1935.

KETNER, C. (3447)

MODELLVERSUCHE UEBER DAS VERHALTEN EINES SCHWEMMSTOFFUEHRENDEN FLUSSES MIT HEFESTIGTEM MITTELWASSERBETT UND HEFESTIGTEN VORLÄNDERN. Bautechnik 14: 98-108. February 4, 1936.

"Munich Hydraulic Laboratory tests of models of straight and winding courses of silt-carrying rivers having stable normal bed; problem was to determine flood stage behavior of Hwangho River in China; silt analysis, determination of effect of distance between levees on flood regime of river."

KINNEY, A. (3448)

FOREST DESTRUCTION AND STREAMFLOW, SOUTHERN CALIFORNIA. Forester 4: 41-42, 82-83, 106-107. February 1898.

"Great damage has been done to many apiaries in Southern California by the January floods." The losses by gullying are stressed. "The experience of Southern California . . . fully demonstrates the fact that a close brush

or forest covering favorably regulates the delivery of rainfall; while on the other hand, this covering destroyed, and especially in cases where the districts are heavily pastured by sheep, the delivery of the rainfall takes on a more and more diluvial and floodlike character."

KRIEGHBAUM, HILLIER.

(3449)

CATCHING RUNAWAY LAND. Today 7: 20-21, 29, illus. January 2, 1937.

Review of silt damage and suggestions for control.

KRIMGOLD, D. B.

(3450)

COLLECTION OF HYDROLOGICAL DATA. The Land, Today and Tomorrow 2: 19-23. March 1935.

This article stresses the importance of agricultural engineering and hydrological data to the Soil Erosion Service and describes their application. The work of the Geological Survey and the Weather Bureau in collecting hydrological information is also discussed.

LANE, E. W.

(3451)

HYDRAULIC PROGRESS. Engin. News-Rec. 118: 174-176. February 4, 1937.

The writer refers to flow, silt, and hydrologic studies of the Soil Conservation Service as being of importance. "Within the past few years hydraulic engineering in the United States has advanced at unusually rapid pace, mainly because of direct application of laboratory experimentation to the design of major engineering works . . ." It is predicted that "The stage now seems to be set for extensive advance in the next few years in the equally important field of hydrology."

LA RUE, E. C.

(3452)

SILT IN COLORADO RIVER. U. S. Geol. Survey Water-Supply Paper 395: 218-226. 1916.

Gives determinations of silt in the river at Yuma, Ariz., discusses the influence of the Gila River, and gives further determinations of silt below the junction of the Green and Grand Rivers.

LAWSON, L. M.

(3453)

EFFECT OF RIO GRANDE STORAGE ON RIVER EROSION AND DEPOSITION. Engin. News-Rec. 95: 372-374. September 3, 1925.

Reviews data which show that the general effect of the Elephant Butte Reservoir, N. Mex., has been to prevent destructive floods in that area and that local sedimentation has been minimized.

Comment by H. Stabler under title "Does Desilting Affect Cutting Power of Streams?" in Engin. News-Rec. 95: 968-969, December 10, 1925.

LEAGUE OF NATIONS, COMMITTEE OF EXPERTS ON HYDRAULIC AND ROAD QUESTIONS IN CHINA.

(3454)

REPORT . . . 213 pp. [Geneva, 1936.] (Series of League of Nations Publications VIII. Transit. 1936. VIII. 4.)

At head of title: Official no.: C. 91. M. 34. 1936. VIII. Geneva, February 10, 1936.

"The Committee has undertaken within the limits of human capacity the study of the crucial problem—namely, the improvement of the defence of the plain against floods . . . The present report therefore deals with the problem of security; the question of irrigation and the less important problem of navigation have been studied in their relationship with the main problem . . . The problem lies not so much in the volume of water discharged as in the immense amount of solid matter, consisting mainly of loess, carried down by the flood waters of the tributaries, and of the main river on a quite exceptional scale, and particularly in the peculiar way in which the loess, attaining on some tributaries as much as 50% in weight, is carried along and deposited, as a result of the changes in speed and the action on friable soil and earthworks of water so heavily laden with solid matter . . . In the present report, the Committee has expressed opinions based on current hydraulic experience, singling out those regarding which reservations must be made so long as no final conclusions can be drawn from the study of the deposit of loess by Chinese rivers."

LEE, W. T.

(3455)

WATER RESOURCES OF THE RIO GRANDE VALLEY IN NEW MEXICO AND THEIR DEVELOPMENT. U. S. Geol. Survey Water-Supply Paper 188, 59 pp., illus. 1907.

"The investigations described in this paper were undertaken for the purpose of gathering information which might aid in the development of the water resources of the Rio Grande Valley in New Mexico. Two general lines of observations were followed, one pertaining to underground waters and their utilization, the other to the storage and conservation of the surface waters."

LEIGHLY, JOHN.

(3456)

TURBULENCE AND THE TRANSPORTATION OF ROCK DEBRIS BY STREAMS. Geogr. Rev. 24: 453-464, illus. July 1934.

Results of distribution of turbulence intensity and its relation to turbidity are presented in charts.

LENNIE, A. B.

(3457)

AGRICULTURE IN MESOPOTAMIA IN ANCIENT AND MODERN TIMES. Scot. Geogr. Mag. 52: 33-46. January 1936.

A paper read at the Norwich meeting of the British Association for the Advancement of Science, September 1935. "In the control of the rivers, the best plan for modern times has been found to be almost precisely that of the ancient engineers . . . The great difficulty in Iraq is the excessive amount of sediment in the water during spates, leading to heavy silting whenever the velocity of the current is checked. This difficulty is minimised in the case of modern canals by ensuring slack-water where they head off."

LOVE, S. K.

(3458)

SUSPENDED MATTER IN SEVERAL SMALL STREAMS. Amer. Geophys. Union Trans. pt. 2, Ann. Meeting 17: 447-452. 1936.

Gives data on discharge and suspended matter for the 15-month period ended June 30, 1935, for streams in Kansas, Missouri, North Carolina, Oklahoma, South Carolina, Texas, Washington, and Wisconsin. The measurements are from 34 gaging stations located on eight regional projects of the Soil Conservation Service.

MACDOUGAL, C. H.

(3459)

BED-SEDIMENT TRANSPORTATION IN OPEN CHANNELS. Amer. Geophys. Union Trans. Ann. Meeting 14: 491-495. 1933.

A discussion of experiments by G. K. Gilbert and others on laws governing sediment transportation. To examine these laws the author constructed an apparatus in the river hydraulic laboratory of the Massachusetts Institute of Technology. The results of his studies are summarized.

MACKIN, J. H.

(3460)

THE CAPTURE OF THE GREYBULL RIVER. Amer. Jour. Sci. (5), 31: 373-385, illus. May 1936.

Abstract: "A small stream rising in the arid central part of the Big Horn Basin, Wyoming, was able to effect the capture of the much larger Greybull River, which enters the Basin from the encircling ranges, because the graded gradient of the small stream, adjusted to the transportation of fine silts and sands derived from weak shales which floor the Basin, was lower than the graded gradient of the Greybull River, adjusted to the transportation of coarse rock waste from the mountains." Includes a map of the Greybull River area, and photographs of the Greybull River and Dry Creek at the extreme low-water stage, showing the contrast between the coarse gravel transported by the Greybull and the fine silt carried by Dry Creek.

MATZKE, A. E.

(3461)

VARIED FLOW IN OPEN CHANNELS OF ADVERSE SLOPE. Amer. Soc. Civ. Engin. Proc. 62: 193-202, 950-960. February 1936.

Discussion by J. C. Stevens, F. T. Mavis, Hunter Rouse, and M. P. White, pp. 950-960.

MAXSON, J. H., AND CAMPBELL, I.

(3462)

STREAM FLUTING AND STREAM EROSION. Jour. Geol. 43: 729-744, illus. 1935.

A study of formation of longitudinal grooves or "flutes" in stream beds due to swiftly moving sand or silt-laden water currents and the importance of stream fluting in fluvial erosion. The process is analyzed on the basis of examples observed in the inner gorge of the Grand Canyon.

MEAD, D. W.

(3463)

HYDROLOGY, THE FUNDAMENTAL BASIS OF HYDRAULIC ENGINEERING. 647 pp., illus. New York, McGraw-Hill Book Co. 1919.

Deals with water, its utilization and control, winds and storms, evaporation, precipitation, rainfall measurements and records, great rainfalls, stream flow and run-off data, and floods and flood control.

MELTON, F. A.

(3464)

AN EMPIRICAL CLASSIFICATION OF FLOOD-PLAIN STREAMS. Geogr. Rev. 26: 593-609, illus. October 1936.

Various flood-plain streams are described. "The classification was the result of necessity, while an attempt was being made to correlate the known features of many different streams."

MEYER, A. F.

(3465)

THE ELEMENTS OF HYDROLOGY. 522 pp., illus. New York, John Wiley & Sons, Inc. 1917. [Rev. 1928.]

Mainly intended for the use of engineers, teachers, and students of engineering. General contents: The Atmosphere, Its Temperature, Pressure and Circulation; Water, Its Various States and Their Properties; Precipitation, Its Occurrence and Distribution; Evaporation from Water Sources; Evaporation from Land Areas; Transpiration; Deep Seepage; Runoff; Stream-Flow Data; Supplementing Stream-Flow Data; and Modification of Stream-Flow by Storage.

MITCHELL, R. H., AND HALL, G. R.

(3466)

SEDIMENTATION IN A SMALL ARTIFICIAL LAKE. Science 85: 426-427. April 30, 1937.

Observations taken from a small artificial lake on the campus of Muskingum College, New Concord, Ohio. "The condition of the pasture fields, the campus, and the cropped areas leads us to believe very strongly that sheet erosion and the small amount of gulying noted in the drainage area have had the greatest influence in producing the sediments which washed down the two small streams and settled in the lake."

[MOSSERI, V. M.]

(3467)

STUDY OF THE NILE WATERS AND SILT. Bull. Union Agr. d'Egypte 34: 123-132. March 1936.

MURPHY, E. C.

(3468)

THE BEHAVIOR OF A STREAM CARRYING SAND AND THE EFFECT OF SAND ON THE MEASUREMENT OF BOTTOM VELOCITY. Engin. News 63: 580-581. May 19, 1910.

"The changes in the appearance of a stream of water as sand is fed into it in increasing amounts are very interesting and the sand movement which gives rise to these changes has an important bearing on some engineering problems."

NAGLE, J. C.

(3469)

SECOND PROGRESS REPORT ON SILT MEASUREMENTS. U. S. Dept. Agr. Off. Expt. Sta. Bull. 119: 365-392. 1902.

Presents in tabular form the general results of all the discharge and run-off measurements made on the Brazos River in Brazos County, Tex., between August 1899 and December 1901. An estimate of total silt carried by the same river is given for November 1900 to February 1902. Similar data are given for the Wichita River at Wichita Falls, Tex., and the Rio Grande at El Paso, Tex.

NAGLE, J. C.

(3470)

THE SILT PROBLEM IN CONNECTION WITH IRRIGATION STORAGE RESERVOIRS. Tex. Acad. Sci. Trans. 4 (pt. 2, no. 3), 14 pp. 1902.

Data are given on the findings of an investigation of economic questions relating to the effect of silt upon irrigation systems making use of storage reservoirs, the effect of silt upon canals, and the effect that the use of certain waters would probably have on vegetation to which they might be applied. Experiments were conducted on the Rio Grande at Earham Bridge, N. Mex., the Brazos River at Jones Bridge, west of College Station, Tex., and the Wichita River at Wichita Falls, Tex.

(3471)

THIRD PROGRESS REPORT ON DISCHARGE AND SILT MEASUREMENTS ON TEXAS STREAMS. U. S. Dept. Agr. Off. Expt. Sta. Bull. 133: 196-217. 1903.

"During the year 1902 gage height and discharge measurements have been made on the Brazos River at Jones Bridge, Brazos County, and also at Richmond, Tex. Similar measurements have also been made on the Colorado River at Wharton, Tex. Both the Richmond and Wharton measurements were made for the purpose of determining the amount of water available for rice irrigation along the lower reaches of the Brazos and Colorado Rivers for those months during which irrigation is most practiced in the Texas coastal plain . . ." The results of these investigations are summarized.

NATIONAL RESEARCH COUNCIL.

(3472)

REPORTS OF THE COMMITTEE ON SEDIMENTATION 1928-1929, 1930-1932, AND 1932-1934. Natl. Research Council Reprint and Cir. Ser. 92, 122 pp., illus, 1930; Bull 89, 1932; and Bull 98, 1935.

The report for 1928-29 contains the following papers: Introduction, by W. H. Twenhofel; The Intertidal Zone of the Wash, England, by E. M. Kindle; Research on Sediments by British Geologists For the Year 1928, by H. B. Milner; Bibliography of Research on Sediments by European Geologists in 1927 and in Part in 1928, by Edouard Parejas; Silt Studies on American Rivers, by Kirk Bryan; Studies on Marine Bottom Deposits at the Scripps Institution of Oceanography, by T. W. Vaughan; Research in Marine Bacteriology, by A. H. Gee; Calcium Carbonate in Sea Water, by A. H. Gee and E. A. Morburg; Research on Marine Sediments Conducted by the American Petroleum Institute, by P. D. Trask; Studies on Sedimentation at the Jaques Loeb Laboratory, Stanford University, by L. B. Becking; Recent Publications on Chert, Flint, Concretions, Cone-in-Cone and Stylolites, by W. A. Tarr; Varved Sediments, by Ernst Antevis; Sedimentational Research on the Pacific Coast, by R. D. Reed; Micropaleontology in the Mid-Continent Region, by Dollie Radler; Heavy Mineral Work in the Mid-Continent Region, by Fannie Carter Edson; Lake Deposits in the Basin and Range Province, by E. Blackwelder; Bibliography on Chemical Studies Which Bear on Sedimentation, by George Steiger; Studies of Glacial Sediments in 1928, by M. M. Leighton; Investigations of Fluvial Deposits, by A. C. Trowbridge.

The report for 1930-32 contains the following papers: Introduction, by W. H. Twenhofel; The Classification and Terminology of the Pyroclastic Rocks, by C. K. Wentworth and Howel Williams; Recent Advances in the Study of Peat, by W. E. Powers; Studies of Recent Marine Sediments Conducted by the American Petroleum Institute, by Parker D. Trask; Experiments with the Settling of Bentonite in Water, by E. M. Kindle; The Relation of the Buffer Mechanism of Sea Water to the Solubility of Calcium Carbonate, by D. M. Greenberg and E. G. Moburg; Notes on Investigations of Modern Marine Sediments in California, by T. W. Vaughan; Bacterial and Chemical Factors in Lime Deposition at Tortugas, Florida, by Holdane Gee; Report on Some Work on Sediments Done in Germany in 1931, by Hans Becker; Varved Sediments, by Ernst Antevis; Chert and Flint, Concretions, and Cone-in-Cone, by W. A. Tarr; Sedimentation Studies at Stanford University, by Elliot Blackwelder; Study of the Abrasional Work of River Ice and of Glaciers, by C. K. Wentworth; Chemical Papers Bearing on Sedimentation, by George Steiger; Some Recent Applications of Physics to Sedimentation Problems, by C. E. Van Orstrand; Investigations in Ground Water Hydrology That Bear on Sedimentation, by A. M. Piper; Research on Sediments by British Scientists During 1930-1932, by H. B. Milner; Recent

Studies With Reference to the Role of Microorganisms in Sediment, by G. A. Thiel; Accessory Minerals of Crystalline Rocks, by A. N. Winchell, E. S. Larsen, J. C. Reed, J. T. Stark, A. C. Tester, and J. F. Wright; Abstracts of Literature on Accessory Minerals of Igneous Rocks, by J. C. Reed; Abstracts of Literature on Accessory Minerals in Sedimentary Rocks as Related to Possible Source Crystalline Rocks, by A. C. Tester; Studies in Glacial Sediments 1930 and 1931, by M. M. Leighton and E. Townley.

The report for 1932-34 contains the following papers: Introduction, by A. C. Trowbridge; Recent European Studies on Sedimentation; Varved Sediments, by Ernst Antevs; German Contributions to the Work on Sediments, 1930-33, by Hans Becker; Sedimentation Studies at Stanford University 1932-1934, by Eliot Blackwelder; Studies in Glacial Sediments, 1932-1933, by M. M. Leighton and Enid Townley; Research on Sediments by British Scientists During 1932-1934, by Henry B. Milner; The Mineralogy of the Sedimentary Rocks, by F. J. Pettijohn; Hydrologic and Hydrographic Investigations That Bear on Sedimentation, 1932-1933, by Arthur M. Piper; Chemical Papers Bearing on Sedimentation, by George Steiger; Current Bibliography of Recent Sediments and Source Beds of Petroleum, by P. D. Trask; Notes on Various Types of Sediments, by W. H. Twenhofel; Studies of Marine Bottom Deposits at the Scripps Institution of Oceanography, by T. Wayland Vaughan; Some Preliminary Observations on Oxidation-Reduction Conditions in Marine Bottom Deposits in the Gulf of Catalina, by C. E. Zo Bell; The Terminology of Coarse Sediments, by Chester K. Wentworth.

NEEDHAM, J. G.

(3473)

BETWEEN THE HILLS AND THE SEA: EROSION'S PROCESSES IN GEORGIA GULLIES AND FLORIDA SWAMPS. Amer. Forests, 39: 198-199, illus. May 1933.

A brief description of "what goes on between the eroding hills and the shoaling harbor and channels . . . Few people know what this outwashed soil does when it is deposited in the flood plains before it reaches the sea." The area discussed is that of the Apalachicola and Chipola Rivers.

O'BRIEN, M. P.

(3474)

NOTES ON THE TRANSPORTATION OF SILT BY STREAMS. Amer. Geophys. Union Trans. Ann. Meeting 17 (pt. 2): 431-436. 1936.

"Several recent papers on the transportation of bed-load and suspended material by flowing water have included assumptions or theories which are in disagreement either with fundamental mechanical principles or with experimental results. Since a number of experimental programs are in progress, a discussion of these problems may be of some value in the interpretation of results." Discusses Gilbert's theory of silt transportation, and the theory of turbulent flow as developed by Von Karman, Prandtl, and G. I. Taylor.

(3475)

REVIEW OF THE THEORY OF TURBULENT FLOW AND ITS RELATION TO SEDIMENT-TRANSPORTATION. Amer. Geophys. Union Trans. Ann. Rept. 14: 487-491. 1933.

"In flowing streams the percentage of suspended material decreases with distance above the bed and, with a certain depth and average velocity, particles above a critical size or specific gravity are not put into suspension. As the random velocities which make up the turbulent flow (turbulent flow as distinguished from laminar or viscous flow) also provide the means for carrying the particles into the interior of the fluid, a quantitative theory of turbulent-flow should also provide a theory for distribution of material in suspension. The present paper is a review of the theory of turbulent flow developed by Osborne Reynolds, Prandtl, von Karman, and Taylor, and of its application to the distribution of suspended material by Schmidt and others."

— AND RINDLAUB, B. D.

(3476)

THE TRANSPORTATION OF BEDLOAD BY STREAMS. Amer. Geophys. Union Trans. 15 (pt. 2): 593-603, illus. 1934.

"The present paper is the result of a critical survey of available data made to ascertain whether or not a quantitative prediction of bed-movement is now possible."

OPPOKOV, E.

(3477)

THE QUESTION OF THE DRYING UP OF RIVER IN ITS PAST AND PRESENT STATUS. Selsk. Khoz. i Lyesov 197: 633-706. 1900.

"On the basis of observations on the Dnieper and Volga the author combats the prevalent opinion that Russian rivers are decreasing in volume. He concludes that the life of rivers and the quantity of water in them depend chiefly on the size of their drainage basins and the quantity and conditions of the precipitation. The influence of a decrease of the area of forests and marshes is only of secondary importance and is commonly greatly exaggerated."—Expt. Sta. Rec. 12: 526. 1900-1.

PARKINS, A. E.

(3478)

VALLEY FILLING BY INTERMITTENT STREAMS. Jour. Geol. 19: 217-222. April-May 1911.

"Streams having steep grades are usually thought to be in active vertical erosion. The writer finds, however, that many intermittent streams are not degrading but are actively aggrading part or all of their valley . . ." Jewell's Creek near Ypsilanti, Mich., is cited as an example of valley filling. "In all such valleys we have an interruption in the normal cycle of erosion, caused by an increase in the supply of waste brought to the headwaters; and when this supply is decreased the stream will clear away the waste and erosion will go on agreeable to the normal order."

PARSHALL, R. L.

(3479)

IMPROVED VENTURI FLUME. Colo. Expt. Sta. Bull. 336, 84 pp., illus. 1928.

The improved Venturi flume, as described in this bulletin, is believed to possess such characteristics as will obviate many of the objections to the weir, orifice, rating flume, or other devices which are now in general use. Thirty-five tables on original free-flow discharge data are included.

PICKELS, G. W.

(3480)

RUN-OFF INVESTIGATIONS IN CENTRAL ILLINOIS. Ill. Engin. Expt. Sta. Bull. 232, 134 pp., illus. 1931.

"The land-drainage problem in Illinois is an important one, especially so in the central part of the State where the topography is so flat and the natural drainage so inadequate that successful agriculture cannot be accomplished without artificial drainage." Description of watersheds, rainfall measurements and computations, water-stage, stream-discharge, and slope measurements are among the subjects studied. Supplementary data on the various phases of the experiments are presented in tabular form.

PIERCE, R. C.

(3481)

MEASUREMENT OF SILT-LADEN STREAMS. U. S. Geol. Survey Water-Supply Paper 400-C: 39-51, illus. 1916.

"Hydraulic engineers who may have occasion to measure streams carrying heavy loads of silt will doubtless be interested in the following account of the special difficulties encountered and the results obtained in measuring the flow of San Juan River." Silt in the San Juan and movement of debris are discussed in detail. "The results of discharge measurements made at the San Juan gaging station, together with a diagram showing the rating curve, area curve, and velocity curve, are presented herewith, as well as estimates for the four months (May to August, 1915) that the writer was engaged on the work."

PYLE, F. D., AND THOMAS, F. T.

(3482)

REPORT ON THE SILT PROBLEM. Amer. Soc. Civ. Engin. Proc. 51: 141-147. March 1925.

This report is a discussion of tabular data on the silt load of the Colorado River, at Yuma Ariz., and siltation of the Elephant Butte Reservoir on the Rio Grande.

RAFTER, C. E.

(3483)

STREAM FLOW IN RELATION TO FORESTS. Amer. Forestry Assoc. (Ann. Meet. 15) 12: 139-165. 1897.

The author discusses the influence of forest cover on stream flow on the basis of measurements and draws the tentative conclusion that in the latitude of middle New York the waste of water due to evaporation from a de-

forested area is 5 to 6 inches a year. This conclusion is reached by comparing data and measurements from the forested upper Hudson area and the deforested upper Genesee area.

RAMSER, C. E.

(3484)

DYNAMICS OF EROSION IN CONTROLLED CHANNELS. Amer. Geophys. Union Trans. Ann. Meeting 15. 488-494, illus. April 26-28, 1934.

"In order to control erosion on both land-slopes and in runoff-channels it is necessary to prevent the runoff-water from attaining a velocity sufficient to erode the soil over which it travels." The value of vegetation in a channel for the reduction of velocity and erosion is discussed and illustrated. The construction, spacing, and control of terraces, as determined from the results of experiments at the Bethany, Mo., and Guthrie, Okla., stations are described.

(3485)

EROSION AND SILTING OF DREDGED DRAINAGE DITCHES. U. S. Dept. Agr. Tech. Bull. 184, 55 pp., illus. 1930.

"The results of observation and cross-sectional and hydraulic measurements made between 1913 and 1921 on 22 dredged drainage ditches in Mississippi, Tennessee, and Iowa are reported . . . Data are also presented on conditions affecting erosion and silting in a channel, and a practical application of the results is described."—Expt. Sta. Rec. 63: 530. 1930.

(3486)

FLOW OF WATER IN DRAINAGE CHANNELS. U. S. Dept. Agr. Tech. Bull. 129, 102 pp., illus. 1929.

This is a detailed study of nine sets of experiments conducted in the South and Midwest. The experiments were for the purpose of determining the roughness coefficient N in Kutter's formula. The author finds among other conclusions, that after a certain amount of erosion has taken place in a channel, further erosion does not necessarily increase the roughness of the perimeter.

(3487)

PROGRESSIVE EROSION IN A DREDGED DRAINAGE CHANNEL. Engin. News-Rec. 82: 876-877, illus. May 1, 1919.

The writer gives observations on enlargement and effect on capacity together with computations of value of N in Kutter's formula from data obtained in Trenton, Tenn.

(3488)

WATERSHED AND HYDROLOGIC STUDIES IN SOIL CONSERVATION. Agr. Engin. 17: 373-376, illus. September 1936.

Conservation of water, flood control, rates and amounts of run-off from watershed areas are the practical reasons for these studies. The studies undertaken by the California Forest Experiment Station, and others conducted in Tennessee, Illinois, and Iowa are discussed as are also experimental studies to be conducted near Coshocton, Ohio, and in the blackland of Texas, near Waco. Preliminary investigations have been made for experimental watersheds in Colorado and the Piedmont.

REED, W. H.

(3489)

SILTING OF RESERVOIRS. U. S. Geol. Survey Water-Supply Paper 146: 126-128. 1905.

In a paper read at the second conference of Engineers of the Reclamation Service, Reed discussed a study made by him during the year which had produced results quite satisfactory from an educational standpoint. The study was based on a survey of Lake McMillan, the principal storage reservoir of the Pecos Irrigation Co. in New Mexico to determine how much sedimentation had occurred during a 10-year period.

RICHARDSON, E. G.

(3490)

MEASUREMENTS OF EROSION BY WATER, USING ELECTRICAL METHODS. 3D INTERNATIONAL CONG. SOIL SCI. Oxford, England, Trans. 1: 405-406. 1935.

"The object of the work to be described was to obtain actual measurements of the quantity of soil carried in suspension at various levels above the bed, and at the same place and time to measure the velocity of the stream."

RICHARDSON, E. G.

(3491)

TRANSPORT OF SILT BY A STREAM. *Phil. Mag.* 17: 769-783. April 1934.

"It has been found that the transport of silt is in the main due to turbulence in the stream, under which conditions the vertical distribution is nearly exponential, and the lifting force . . . is proportional to the square of the velocity. Below the critical speed the silt is moved to a much less extent, and the movement is confined to the smaller particles in the lower strata of the stream." The writer summarizes these investigations in conclusion.

(3492)

THE TRANSPORT OF SOIL AND SALTS BY RUNNING WATER. *Internatl. Soc. Soil Sci. Proc.* 12 (1): 8-9. 1937.

"This paper forms a report on progress made by the author in studying the fundamental aspects of the erosion problem since the Congress at Oxford." Presented at the meeting of the sixth commission of the International Society of Soil Science, Zurich, 1937.

ROBINSON, H. F.

(3493)

SILT PROBLEM OF ZUNI RESERVOIR. *Amer. Soc. Civ. Engin. Trans.* 83 (Paper 1443): 868-893. 1920.

A discussion by E. Mead, C. S. Jarvis, and G. M. Post is included.

ROBINSON, W. G.

(3494)

"UNDISCLOSED ASSETS" DISPOSING OF SILT. *Dak. Farmer* 54: 260-261. June 1934.

In discussing the sediment basin of the upper reaches of the Missouri River the writer says: "The influence of erosion and the deposits of sediment occasioned thereby, together with the transport possibilities, will be discussed herein." Silting must be stopped at or near its source. The Missouri River, which is a great silt carrier, must be controlled, and in its control lies a partial solution of the flood control of the lower Mississippi.

ROTHERY, S. L.

(3495)

A PROBLEM OF SOIL IN TRANSPORTATION IN THE COLORADO RIVER. *Amer. Soc. Civ. Engin. Trans.* 99 (Paper 1868): 524-543, illus. 1934. [discussion by C. E. Grunsky and others, pp. 544-575.]

"This paper is concerned principally with the problem of excluding soil, transported by the Colorado River, from the Canal System of Imperial Valley, in California. Its purpose is: (a) to feature the relative importance of the bed load of the Colorado River and to provide some conception of the extent of the unknown volumes of soil transported; (b) to present known and anticipated future river-flow conditions, pertinent to soil conveyance; and (c) to propose fundamental requirements for a diversion structure that will exclude all the bed load and a part of the suspended load, thus permitting minimum sizes for—or, perhaps, eliminating as unnecessary—the enormous settling basins which are expected to desilt the large diverted flow, and also permitting lessened sluicing operations for the disposal of the sludge."

(3496)

SILT AND CHANNEL CONDITIONS IN COLORADO RIVER DELTA. *Engin. News-Rec.* 95: 1068-1071, illus. December 31, 1925.

This article describes how deposition contributes to instability of channels and the effect of flood scour on levees. "The repeated dismissals of engineers as soon as they have become educated to delta conditions is a menace to the security that is apparently afforded by the protective levees."

ROTHROCK, J. T.

(3497)

CHANGES IN THE VOLUME OF STREAMS. *Forest Leaves* 4: 150-151. August 1894.

The author presents information acquired through published correspondence concerning the effect of deforestation on streams in New Jersey, notably, Keasbey's Creek, Fenwick Creek, Cooper's Creek, Mantua Creek, and the Delaware River.

ROUSE, HUNTER. (3498)

MODERN CONCEPTIONS OF THE MECHANICS OF FLUID TURBULENCE. Amer. Soc. Civ. Engin. Proc. 62: 21-63, 808-812. 1936.

"The purpose of this paper is to summarize and interpret the modern scientific methods of approach that have made such progress possible, using the subject of flow in circular pipes as the simplest and most pertinent means of illustration."

Discussion by S. F. Yasines, Benjamin Miller, and R. W. Powell, pages 808-812, contains a resume of the investigations which have been made in the field of fluid turbulence since the middle of the nineteenth century.

RUBEY, W. W. (3499)

ALLUVIAL ISLANDS; THEIR ORIGIN AND EFFECT UPON STREAM REGIMEN. Wash. Acad. Sci. Jour. 22: 458. September 19, 1932.

The author describes the alluvial islands found in the Mississippi, Missouri, and Illinois Rivers.

(3500)

SETTLING VELOCITIES OF GRAVEL, SAND, AND SILT PARTICLES. Amer. Jour. Sci. (5) 25: 325-338. April 1933.

Offers an analysis of Stokes' law of viscous resistance, which is found to apply to small rounded quartz grains. It is stated that coarse sand, pebbles, and boulders follow a totally different law—the impact formula. Stokes' law and the formula are combined in a general equation for the settling velocities of large and small grains.

SAVILLE, THORNDIKE. (3501)

DEFICIENCIES IN PRESENT WATER RESOURCES INFORMATION. Jour. Amer. Waterworks Assoc. 27: 964-982. August 1935.

Shows the necessity of "a far more comprehensive and scientific approach to the investigation of our water resources involving particularly standardized and coordinated procedures for the collection compilation, and publication of basic hydrological information." Policies and practices for stream-flow and run-off measurement are outlined.

SHAW, E. W. (3502)

RATE OF CONTINENTAL DENUDATION. Science 41: 244-245. February 12, 1915.

The author points out the practical value of determinations of mineral matter carried by the Mississippi River with facts showing the importance of water analysis, corroborated with bibliographical references. This contention, through the editor's forum, is in contradistinction to statements made by C. Keyes in Science 40: 933-934. 1914.

STABLER, H. (3503)

SOME STRAEEAM WATERS OF THE WESTERN UNITED STATES, WITH CHAPTERS ON SEDIMENT CARRIED BY THE RIO GRANDE AND THE INDUSTRIAL APPLICATION OF WATER ANALYSES. U. S. Geol. Survey Water-Supply Paper 274, 188 pp. 1911.

"A systematic study of the waters likely to be utilized on the Reclamation Service projects was made in order to determine the influence of the salinity of the waters on the growth of vegetation and the effect of suspended matter in silting canals and reservoirs." The work was begun early in 1905 and continued during 1906. Samples were collected for an extended period at 55 stations. "The point of collection was selected with a view to obtaining a fair average sample of the water flowing in the stream, and occasionally samples were taken from different parts of the cross section in order to determine any possible local variation in quality of waters." Results at sampling stations are given in full, and the methods of analysis and accuracy of work and tables considered.

— AND PARKER, H. N.

(3504)

THE SILT PROBLEM: KAW RIVER. Engin. News 63: 643-644. June 2, 1910.

This paper summarizes a silt-deposition study covering 72 periods of approximately 10 days each from 1900 to 1908. An analysis of the study is presented in tabular form.

STEARNS, N. D.

(3505)

LABORATORY TESTS ON PHYSICAL PROPERTIES OF WATER-BEARING MATERIALS.

U. S. Geol. Survey Water-Supply Paper 596: 121-176, illus. 1928.

"This paper describes briefly the apparatus and methods used in making tests of mechanical composition, porosity, moisture equivalent, and permeability, gives the data obtained from the first 97 samples that were tested, and discusses to some extent the interpretation and use of these data. The samples for which results are given in this paper were obtained in 1923 by geologists who were making ground-water studies. The samples from New Jersey are all unconsolidated sand and gravel . . . Those from Montana comprise unconsolidated sand, silt, and gravel and consolidated rocks, chiefly sandstone and shale . . . The samples from Idaho are chiefly surface silt and loess that mantle certain reservoir sites."

STEVENS, J. C.

(3506)

THE SILT PROBLEM. Amer. Soc. Civ. Eng. Proc. 60: 1179-1218, illus., October 1934; 62 (8, pt. 2): 207-288. October 1936.

Includes discussions by H. G. Nickle, E. W. Lane, F. E. Bonner, M. P. O'Brien, H. F. Blaney, W. W. Waggoner, P. R. Bisschop, Herman Stabler, N. C. Grover, and J. C. Stevens. "All the basic data that the writer could secure on the silting of reservoirs, where actual capacity surveys have been made to determine the extent of silting, are contained in this paper. Remedial measures for silt elimination are presented and discussed. A table contains a brief of all data on the silt transported by the streams of the world. The physical laws of silt transportation are outlined with pertinent discussion. The control of silt in canals, reservoirs, and on watersheds is then considered. The paper closes with data and discussion on the origin of silt."

STRAUB, L. G.

(3507)

TRANSPORTATION OF SEDIMENT IN SUSPENSION. SOME PRACTICAL CONCLUSIONS FROM FIELD AND LABORATORY INVESTIGATIONS. Civ. Engin. 6: 321-323. May 1936.

Outlines some of the findings concerning the principles underlying transportation of sediment in suspension, as follows: the manner in which particles of various diameters distribute themselves in verticle section; the effect of certain changes in the chemical composition of the water on the mechanical composition of suspended load; and the relation between the stream discharge and the quantity of sediment in suspension. Also discusses the selection of a model law to insure similarity in laboratory studies of sedimentation basins.

STREIFF, A.

(3508)

REPORT OF STREAM-FLOW PREDICTION COMMITTEE. U. S. Monthly Weather Rev. 59: 73-74. February 1931.

Past and present methods of prediction with their utility are discussed. Stream flow in the Great Lakes region and in Michigan are treated, with a graph representing the flow of the Muskegon River in Michigan.

SYKES, GODFREY.

(3509)

THE COLORADO DELTA. Carnegie Inst. Wash. Pub. 460, 193 pp., illus. [Washington, D. C.] 1937.

Divided into three parts: History of Exploration and Navigation; Physiographic History; and Stream Dynamics. Headings of part III are: The Detrital Load of the Colorado River Water; Fluctuation and Rhythm in the Movement of Debris; Deposition of the Detrital Material.

Bibliography, pages 177-188.

TAYLOR, T. U.

(3510)

RESERVOIR LOSES 84% OF STORAGE CAPACITY IN NINE YEARS. Engin. News-Rec. 91: 380-382, illus. September 6, 1923.

Describes siltation in the Austin Dam on the Colorado River at Austin, Tex.

SILTING OF RESERVOIRS. Tex. Univ. Bull. 3025, 170 pp. illus. July 1930. (3511)

"The silting of reservoirs is always a factor in and at times a menace to water storage. The short life of some of the reservoirs of the United States

is startling and tragic." The author devotes 16 chapters to the silting of reservoirs and in chapter XVII discusses methods of desilting.

TAYLOR, T. U.

(3512)

SILTING OF THE LAKE AT AUSTIN, TEXAS. Tex. Univ. Bull. 2439, 23 pp., illus. October 15, 1924.

"The silting-up of reservoirs, for purposes of comparison, is best reduced to heights or depths on a square-mile base. The results will not be true for any reservoir in which there is an appreciable current acting on the bottom of basin; i. e., on the upper surface of the silt. In the old lake at Austin the lake level could sink to ten feet below the crest of the dam, and still have a fair current in the penstocks, as the bottom of the forebay was 12 feet below the crest of the dam." Historic floods on the Colorado and Brazos Rivers are discussed.

(3513)

THE SILTING-UP OF LAKE McDONALD AND THE LEAK AT THE AUSTIN DAM. Engin. News-Rec. 43: 135-136, illus. February 1900.

Gives a discussion and analysis of tables showing the maximum and mean depths of water for 1893 and 1900, the maximum and mean depths of silt for 1900, and the percentage of silting up at 16 different stations on the Colorado River.

THOMAS, H. A.

(3514)

THE HYDRAULICS OF FLOOD MOVEMENTS IN RIVERS. Ed. 2., 70 pp., illus. Carnegie Institute of Technology, Pittsburgh. [1934.]

The introduction contains the following statement: "The purpose of this bulletin is to present those elements of the hydraulic theory of unsteady flow in open channels, which are needed in rivers, and to discuss various approximate methods which have been used or proposed for handling such problems. Much of this material has not been previously published, or is derived from sources not readily available to engineers."

TOWL, R. N.

(3515)

HANDLING SILT IN SETTLING BASINS. Engin. and Contract. 62: 341-344, illus. August 13, 1924.

"The best settling basin is the natural one: where the overflow spreads out near the base of the debris or higher up, and flows out over the fan in a shallow, broad sheet. This quickly reduces the velocity and drops the silt, then the simple method of returning the flood waters to the channel of the ditch is accomplished by a pick-up ditch or a lateral . . ." Examples of floodway construction by silt deposits are cited, and a special design for economical construction of a floodway ditch is given. "We should have a better understanding of the causes of erosion and transportation of silt to the end that there may be more stabilized channels and reduced cost of maintenance."

(3516)

SILT CONTROL FOR DRAINAGE AND FLOOD DITCHES. Agr. Engin. 8: 334, illus. December 1927.

The author enumerates 10 silt transportation factors in running water. "The foregoing general suggestions are important but by no means all-inclusive." That primary causes of floods in alluvial valleys is channel deterioration, caused by sedimentation, is affirmed.

TOWNSEND, C. McD.

(3517)

THE FLOW OF SEDIMENT IN THE MISSISSIPPI RIVER AND ITS INFLUENCE ON THE SLOPE AND DISCHARGE WITH ESPECIAL REFERENCE TO THE EFFECT OF SPILLWAYS IN THE VICINITY OF NEW ORLEANS, LA. Miss. River Comm., St. Louis, Mo., 19 pp., illus. 1914.

Examines data which show that although the construction of a spillway would not seriously affect navigation of the Mississippi River and would materially reduce flood heights, to maintain it after construction would require such an enormous amount of dredging as to render the entire project impracticable.

- TRASK, PARKER D. (3518)
 COMPACTION OF SEDIMENTS. Amer. Assoc. Petroleum Geol. Bull. 15: 271-276, illus. March 1931.
 "The initial water content of sediments varies with the fineness of the constituent particles. A tentative estimate indicates that it is approximately 45 per cent in well sorted fine-grained sands, 60 per cent in silts, 80 per cent in clays, and more than 90 per cent in colloids. In general, deposits that accumulate over submerged ridges are coarser than those that form in basins. Consequently, sediments deposited on submarine topographic 'highs' should compact less than those that accumulate in 'lows'."
- AND HAMMAR, HARALD E. (3519)
 DISTRIBUTION OF ORGANIC MATTER IN RECENT SEDIMENTS. Geol. Soc. Amer. Bull. 42: 184-185. March 31, 1931.
- TWENHOFEL, WILLIAM H. (3520)
 TREATISE ON SEDIMENTATION. 926 pp., illus. Baltimore, Williams & Wilkins Co. 1932.
 Contents: Sources and Production of Sediments; The Transportation, Deposition, Diagenesis, and Lithification of Sediments; Important Conditions Modifying Sedimentary Processes; Sediments and Organisms; Products of Sedimentation; Structures, Textures, and Colors of Sediments; Environments or Realms of Sedimentation; Field and Laboratory Studies of Sediments.
- UNITED STATES BUREAU OF RECLAMATION. (3521)
 BIBLIOGRAPHY ON THE SUBJECT OF TRANSPORTATION OF SOLIDS BY FLOWING WATER IN OPEN CHANNELS. 108 pp. 1933. [Mimeographed.]
 "This bibliography has been compiled for the purpose of studying the silt and bed load problem in connection with the design of the All-American Canal . . . [it] has been made in two parts. Part I lists by authors all works thought to have any bearing on the general subject . . . Part II is a sub-classification by subject and the listing is by numbers referring to Part I."
- UNITED STATES CONGRESS. (3522)
 MISSOURI RIVER. 73d Cong. 2d sess., House Doc. 238. pp. 1032-1182. 1935.
 Includes sections on the origin of silt and aspects of soil erosion, silt transportation, mechanical composition of silt and bed sediment, weight and specific gravity of silt and sediment, detritus transportation, riverbed changes, special problems due to influence of sedimentary load, and relation of sedimentary characteristics of Missouri River to flood control.
- UNITED STATES FOREST SERVICE, SOUTHERN FORESTRY EXPERIMENT STATION. (3523)
 EROSION—STREAMFLOW. South. Forestry Expt. Sta. Ann. Rept. 14: 24-28. 1935. [Mimeographed.]
 Reviews the work of the southern forestry experiment in erosion control from 1931 to 1935. Various types of plantings are described. The results of experiments in surface run-off are also reported.
- [UNITED STATES] NATIONAL RESOURCES COMMITTEE, WATER RESOURCES COMMITTEE (3524)
 DEFICIENCIES IN BASIC HYDROLOGIC DATA. REPORT OF THE SPECIAL ADVISORY COMMITTEE ON STANDARDS AND SPECIFICATIONS FOR HYDROLOGIC DATA. 66 pp., illus. September 1936. Washington, Govt. Print. Off. 1936.
 Remedies are proposed for current deficiencies in hydrologic data essential for sound water conservation. The report cites striking examples of financial and human losses attributed to lack of basic data.
- (3525)
 HYDROLOGIC STUDIES RECOMMENDED. Engin. News-Rec. 117: 487, illus. October 1, 1936.
 The Water Resources Committee recommends a Federal program for study of hydrologic data.
- UNITED STATES SOIL CONSERVATION SERVICE. (3526)
 T. V. A. PLANTS TREES, BUILDS CHECK DAMS, IN MOVE TO PROTECT NORRIS DAM FROM SILTING. Soil Conserv. 2: 114-115, 130, illus. December 1936.

UNITED STATES SOIL EROSION SERVICE.

(3527)

PRELIMINARY REPORT ON THE BENEFICIAL USES OF WATER RESOURCES, PRINCIPAL STREAMS OF UNITED STATES. 52 pp., illus. 1934. [Mimeographed.]

"This report includes brief outlines of the problem of accelerated erosion, runoff and silting of stream channels and reservoirs . . . [it] includes a statement of the erosion problem on pages 1-8, inclusive; a rough outline of the proposed working plan, pages 9-20, inclusive; and quantitative statements with respect to the principal eroding areas of the nation on pages 21-27, inclusive; followed by very brief treatments of the several divisions and the individual watersheds under each."

[UNITED STATES] WAR DEPARTMENT, CORPS OF ENGINEERS, UNITED STATES ARMY.

(3528)

STUDIES OF RIVER BED MATERIALS AND THEIR MOVEMENT WITH SPECIAL REFERENCE TO THE LOWER MISSISSIPPI RIVER. U. S. Waterways Expt. Sta. Paper 18, 161 pp. 1935.

Part 1 of this paper describes flume studies of river-bed materials to determine the effects of variation in composition of sediment, slopes of bed and water surface, and depth of water in flume. Part 2 gives results of a study of mechanical composition of 531 samples from the thalweg of the Mississippi River between Cairo and New Orleans and 143 samples from tributaries.

VAN ORNUM, J. L.

(3529)

THE REGULATION OF RIVERS, 393 pp., illus. New York, McGraw-Hill Book Co. 1914.

"The regulation of rivers involves the control of flowing water. It therefore is based upon hydraulic laws." The author says that the improvement of waterways is a commercial necessity, and that both theory and experience are essential. "It therefore seems important to give fundamental consideration to principles underlying operations; and this purpose has dominated the writing of this book. Not only are those scientific laws presented which are of proved relevance, but also other propositions which give promise of reducing many uncertainties of procedure to definite details of control; especial care has also been taken to discuss quite fully the methods and results of experimental investigations and other endeavors to secure a more complete knowledge of the laws involved. It is not an art, but as an applied science that the regulation of rivers must especially develop; and in the measure that scientific principles govern will these public works prove successful."

VETTER, C. P.

(3530)

DESILTING WORKS FOR ALL-AMERICAN CANAL. West. Construct. News 10: 288-290. October 1935.

Describes a plant designed to remove 70,000 tons of silt per 24 hours from Colorado River water for Imperial Valley.

VON ENGELN, O. D.

(3531)

DEPOSITION OF SEDIMENT IN LAKES BY GLACIAL STREAMS. Science 73: 313-314. March 20, 1931.

The author comments on the discharge of the Rhone River into Lake Geneva and the Cayuga inlet stream into Lake Cayuga.

(3532)

FALLING WATER. Sci. Monthly 28: 422-429. May 1929.

The erosive action of water, whether in flow or frozen, on rock is described. Various waterfalls, among them Niagara, are discussed, and deductions are made as to their formation by stream flow and its processes as well as by other agencies.

WALLACE, R. C., BAKER, W. F., AND WARD, G.

(3533)

THE RED RIVER AS AN EROSION AGENT. Roy. Soc. Canada Proc. and Trans. (3) 20 (sec. 4): 149-167, illus. 1926.

"This investigation was carried out in order to determine accurately the nature of the dissolved and suspended materials carried by the Red River, their relation to the composition of Lake Winnipeg into which the river flows and to such contrasted types as the Mississippi and St. Lawrence Rivers." Table of contents: The Drainage Area of the Red River; Analysis

of Red River; Discussion of Analyses; The Leaching of Surface Materials in the Red River Basin; Total Erosion and Sedimentation; The State of Silica in Red River Water; and Comparison with Other Rivers.

- WILLIAMS, MERTON Y. (3534)
LAND MOVEMENTS AND SEDIMENTATION. Bull. Geol. Soc. Amer. 43: 993-1002.
December 30, 1932.

The writer was asked for an explanation of the repeated vertical land movements apparently involved in the changing shore lines of ancient seas as depicted from his paleographic maps. "The principle of diastrophism seemed to be overworked when called on to explain marked recessions and advances of shorelines during a single geologic period. The quest for a solution of this problem continued during succeeding years without result, until a study was made of the stratigraphy of the southern plains of Canada for the Canadian Geological Survey . . . which provided data for comparative studies of rate of deposition of coarse and fine detritals, and for a quantitative comparison of deposition of sediments and vertical land movements. The observations upon which conclusions have been based and the reasoning applied are here recorded."

- YARNELL, D. L. (3535)
DETERMINING FLOOD DISCHARGES FROM SMALL WATERSHEDS. Agr. Engin. 18:
13-14, illus. January 1937.

"In the course of working up flood data in connection with rainfall records, contained in the U. S. Department of Agriculture Miscellaneous Bulletin no. 204, entitled 'Rainfall Intensity Frequency Data,' it was observed that on each watershed studied there was a direct relation between the amount of rainfall and flood discharges. A graphic method of representing this relationship has been devised so that it is apparently possible to predict flood magnitudes and frequencies from fragmentary or short-period data."

- AND WOODWARD, S. M. (3536)
FLOW OF WATER IN DRAIN TILE. U. S. Dept. Agr. Bull. 854, 50 pp., illus.
1920.

"Realizing the need for accurate knowledge regarding the flow of water in tile drains, plans for investigating this subject were made by the drainage division of the Bureau of Public Roads, early in 1915. The experiments so far made concern only the smaller sizes of tile, and this report therefore should be considered as a progress report of the investigation of the whole subject . . . The investigation herein reported deals only with the discharge or carrying capacity of tile drains as conduits. No tests were made on sizes smaller than 4 inches in inside diameter . . . This report includes a detailed description of the equipment and methods used and the tabulated data from the experimental work."

- YOUNG, W. R. (3537)
BOULDER DAM PLAYS ITS PART IN RECLAMATION. Reclam. Era 27: 26-28, illus.
February 1937.

The silt problem of Boulder Dam is discussed, pages 27-28.

- YOUNGQUIST, C. V. (3538)
MEASURING OHIO'S RIVERS. IX. STREAM FLOW DURING THE WATER YEAR 1935.
Ohio Engin. Expt. Sta. News 8: 18-19. February 1936.

Stream flow during the water year 1935 was deficient and exhibited great variations caused by the unusual distribution of rainfall. Tables show discharge for year ended September 30, 1935, as compared with average discharge, and comparison of stream discharge during 1935 water year with that of 1928.

- ZOCH, R. T. (3539)
ON THE RELATION BETWEEN RAINFALL AND STREAM FLOW—II. U. S. Monthly
Weather Rev. 64: 105-121. April 1936.

It is here shown that, regardless of how irregular any natural drainage area may be, systematic methods can be used for predicting its discharge. The author states that this article, second of a series on the subject (see Monthly Weather Review vol. 62: 315-322, September 1934) presupposes acquaintance with the first article.

VEGETATIVE AND TILLAGE CONTROL IN GENERAL

ANONYMOUS.

(3540)

DO YOU STRIP-CROP AND TERRACE YOUR LAND? Prog. Farmer (Car.-Vir. Ed.) 49: 8, 42, 57. February 1934.

An interview with the Chief of the Soil Conservation Service in which he laid bare the evils of soil erosion and advocated strip cropping, cover crops, permanent grass, or forest cover on steep slopes, crop rotations, and terracing as preventive measures.

(3541)

MAINTAINING FERTILITY IN MIXED FARMING. THE USES OF GREEN MANURING. Field [London] 167: 666. March 21, 1936.

Presents methods of growing green-manuring crops which are successfully adapted to rotations in England. Mustard, rye, lupines, and Italian ryegrass are best used as summer catch crops; red clover, trefoil, Italian ryegrass as undersown crops for plowing under in winter; green manure as a main crop only on poor sandy soils as a preliminary to more profitable rotations; and mustard is widely grown for plowing in with wheat and oats.

(3542)

THE ROBBER THAT STEALS OUR SOIL. New Agr. Rev. 1: 8-9, illus. December 1931.

Summarizes the damage by soil erosion throughout the United States and recommends as control measures, proper plowing and the growing of suitable crops such as sweetclover, red clover, alfalfa, rye, soybeans, and the vetches. Terracing is suggested as a valuable control method.

(3543)

SOIL WASHING. Hoard's Dairyman 51: 219: February 25, 1916.

A few years of unchecked soil washing causes greater plant-food loss than several generations of continuous cropping. The author recommends winter cover crops, contour farming, and deep plowing, among other preventive measures.

(3544)

SOILING PRACTICE FOR THE BLACKLAND. Farm and Ranch 55: 29. April 15, 1936.

The advantages of sorghum over legumes for soil conservation on Hous-ton black clay soil, with best methods for planting are pointed out.

(3545)

WHAT IS SOIL EROSION? Dakota Zephyr 2 (2): 10-11. March-April 1936. [Mimeographed.]

States that to prevent wind erosion, bare soil must be kept rough until a cover crop can be established. Discusses also the origin of soil washing.

ALLISON, R. V.

(3546)

SOIL EROSION STUDIES DEVELOP INFORMATION OF HIGH PRACTICAL VALUE. U. S. Dept. Agr. Yearbook 1935: 299-305, illus. 1935.

"Control of soil losses by wind may be promoted by the use of judiciously spaced windbreaks and protective covers of close-growing vegetation, as well as by the adoption of proper methods of cultivation . . ." Crop rotation, strip cropping, terracing, and other control measures are considered.

APPLEGATE, V. G.

(3547)

VISIT EROSION EXPERIMENTS. Ohio Farmer 178: 15. August 1, 1936.

The writer describes a soil erosion experiment station demonstration at Zanesville and various farms in Salt Creek Valley, Ohio. Experiments included use of fertilizers on corn plots, terracing, strip farming on hillside fields, and 4-year rotation of corn, wheat, clover, and timothy.

AUNE, B.

(3548)

SUGGESTIONS TO SETTLERS ON THE BELLE FOURCHE IRRIGATION PROJECT. U. S. Bur. Plant Indus. Cir. 83, 14 pp. 1911.

Work on the Belle Fourche project, comprising about 90,000 acres in South Dakota, is outlined. Among the suggestions made are the cultivation

of certain short-season grains, vegetables, and fruits, proper trees for wind-breaks, and the application of organic matter to the heavy soils.

- BAUER, F. C. (3549)
CROP YIELDS FROM ILLINOIS EXPERIMENT FIELDS IN 1932; TOGETHER WITH A GENERAL SUMMARY FOR THE ROTATION PERIODS ENDING IN 1932. Ill. Agr. Expt. Sta. Bull. 398, pp. 483-539, illus. 1934.

Sixty-seven tables show crop yields from 27 fields. Condensed rotation summaries indicate, in terms of money values, the results from soil treatments.

- BEELE, M. N. (3550)
CURES FOR SOIL BLOWING. Capper's Farmer 47: 8-9, illus. February 1936.

Describes the tillage and planting practices of 24 Plains country farmers in the control of wind erosion. Summer fallow has become the standard practice for increasing crop yields in the Plains because it stores moisture and eliminates weeds, but serious wind erosion may occur if the ground remains too dry for germination. Illustrations show listing and strip-cropping methods.

- (3551)
SAFETY METHODS FOR PLAINS WHEAT. Capper's Farmer 47: 8-9, 31, illus. August 1936.

"New system gives control of the two most important production factors—moisture storage and wind and water erosion."

- BENNETT, H. H. (3552)
SOIL SALVATION. Country Gent. 104: 13, 57, illus. February 1934.

Erosion control by means of strip cropping is encouraged. "Invariably good stands of grass, lespedeza, alfalfa, and other dense covers have proved super-conservers of both soil and water. The results have been almost unbelievable. They have shown that these matted growths not only stop soil wasting on moderate slopes, but slow it down to a large extent on steep land, and cause largely increased absorption of rain where it falls."

- AND RUFF, A. F. (3553)
THE TRUE STORY OF PETER JONES. Prog. Farmer (Car.-Va. Ed.) 51: 10. December 1936.

An object lesson in scientific farming, involving strip cropping and plowing under of a soil-improving crop over a fourth of the farm each year.

- BOLLINGER, JOHN R. (3554)
USING CROPS FOR EROSION CONTROL. Save Our Soil 1: 1, 4. February 1937.

Recommends various rotation crops and also suggests that land too steep for crop production be converted to pasture.

- BUTLER, EUGENE. (3555)
SOIL-SAVING METHODS PROVE WORTH. Prog. Farmer. (Tex. Ed.) 52: 10, 14, illus. January 1937.

Soil and water conservation demonstrations in Texas are described. Special mention is made of the use of Hubam clover. Blackland farmers "are confronted with a real problem in trying to grow legumes on land infected with root rot . . . Hubam may be the legume they have been looking for." Strip crops without terraces for gentle slopes have proved successful.

- CARAWAY, J. M. (3556)
AVOIDS SOIL WASTE. Capper's Farmer 47: 10. October 1936.

Louis Spatz of Jersey County, Ill., thinks "terracing is the easy way out of the difficulty, and like most make-shift methods it involves more work later on." He prefers and has practiced successfully a soil-saving system based upon a rotation of 2 years of corn, 1 year of oats and sweetclover. The clover is plowed in as a soil builder. "One of the big problems in soil erosion is avoided by sod strips."

- CARDON, P. V. (3557)
TILLAGE AND ROTATION EXPERIMENTS AT NEPHI, UTAH. U. S. Dept. Agr. Bull. 157, 45 pp., illus. 1915.

"The experimental work at the Nephi (Utah) substation has been conducted cooperatively since 1907 . . . A preliminary report of all the work

at Nephi was published in 1910. This report was rather general in its nature, owing to the fact that the experiments had been conducted during only a brief period and no conclusive results were available . . . The present bulletin presents the results of the cultivation experiments with dry-land cereals."

CARRIER, LYMAN. (3558)

SUGGESTIONS FOR PROMOTING THE AGRONOMIC WORK AND COORDINATING IT WITH OTHER BRANCHES OF SOIL EROSION SERVICE. U. S. Soil Erosion Serv. S. E. S., 6 pp. 1935. [Mimeographed.]

Recommendations are made for crop rotations, strip cropping, introduction of new crops, native vegetation, rates of seeding, care of pastures, and purchase of materials.

CHARLES, F. E. (3559)

SQUARE FARMING IN ROUND COUNTRY. *Successful Farming* 34: 14, 38, illus. September 1936.

Experiments with corn at the erosion experiment station at Zanesville, Ohio, are described. Terracing and contour plowing in hill country go hand in hand with soil and water control. Strip cropping and rotation crops are advocated.

CHARLES, TUDOR. (3560)

WESTERN KANSAS PLANS PERMANENT CURBS FOR WIND EROSION DAMAGE. *Kans. Farmer* 74: 9, 19. April 10, 1937.

Discusses a conference of Kansas farmers at Dodge City. Wind-erosion control was an important feature of the conference. "Methods receiving most attention were moisture conservation by contouring, basin-listing, terracing and fallow; this to be followed by establishment of vegetative cover on considerable areas of land. Listing Sudan grass in Black Amber cane and leaving it on the field, was favorably discussed."

DANIEL, H. A. (3561)

RESULTS OF TERRACING AND CONTOUR CULTIVATION. *Farm and Ranch* 55: 1, 7, illus. March 1, 1936.

Presents results of an experiment to compare the yield of tepary bean hay grown on terraced and contour cultivation plots with that grown on unterraced land.

DAVIS, LUTHER. (3562)

IMPROVING DELTA SOILS WITH HAIRY VETCH. ONE FARMER'S METHODS AND RESULTS HE HAS SECURED. *Prog. Farmer* (Miss. Valley Ed.) 51: 6. July 1936.

The author presents detailed results of his experiments with hairy vetch as a soil builder in Delta soils on his farm near Chatfield, Ark., with special reference to fertilizer and rotational treatments. Comparative results of different methods of treatment are given in tabulated form.

DUNTON, H. L. (3563)

MEADOW STRIPS IN EROSION CONTROL. *Soil Conserv.* 1: 10-11, illus. March 1936.

ENLOW, C. R. (3564)

AGRONOMY'S CONTRIBUTION TO FLOOD CONTROL AND DROUGHT RELIEF. *Soil Conserv.* 2: 191-192, 200, illus. March 1937.

Good vegetative cover throughout the year would aid materially in minimizing flood hazards. To reestablish this cover on pastures and ranges, "it is necessary first to conserve the water that falls so that it can be utilized by the vegetation. This can be accomplished in large measure by the construction of contour furrows." Deferred and rotation grazing is a recognized system of value in the production of reserve food, and both flood control and drought relief can be aided by "the encouragement of a well-rounded agronomic program based on proper land use that will help maintain the organic matter and the fertility."

ENLOW, C. R.

(3565)

AGRONOMIC PROGRAM FOR EROSION CONTROL. Soil Conserv. 1: 10-11, 15, illus. June 1936.

"The agronomic program of the Soil Conservation Service is primarily concerned with the use of field crops, pastures and ranges in such ways as to conserve soil and water, maintain production, and improve the lands."

FEHER, D.

(3566)

SOME REMARKS ON THE PROBLEM OF CROP ROTATION, WITH PARTICULAR REFERENCE TO THE REVERSION TO FOREST CROPS OF SOILS EXHAUSTED BY AGRICULTURAL USE. Erdészeti Lapok 75 (3): 274-289. 1936.

Continual agricultural utilization of forest soils is followed by strong chemical, physical, and biological changes in the soil condition. An agricultural utilization without manuring takes away the same quantity of nourishing substances in 8 to 10 years as a forest management during a rotation of 100 to 120 years. The soil must be given back artificially that which has been taken away if crop rotation is to be successful.

GALLAGHER, R.

(3567)

PRESERVATION AND IMPROVEMENT OF SOILS. Tenn. Dept. Agr. Bien. Rept. (Farmers' Inst. Papers) 1903-4: 120-124. 1904.

The causes of land waste are discussed by the author, and the use of rotation crops is urged. "I propose to outline a rotation that I have practiced for years which I know will restore this humus and bring back these unproductive and unsightly fields from barrenness to the production of paying crops. The first step is to stop the waste, fill the gullies, and plow thoroughly." Then rotation crops of peas, rye plowed under, wheat in the following autumn, corn in the spring followed by wheat and later, clover. Then begin again with peas.

GEIB, H. V.

(3568)

MANY SPECIAL PROBLEMS IN TEXAS BLACKLANDS. The Land, Today and Tomorrow: 18-21. December 1934.

This account of the work at the Elm Creek watershed with headquarters at Temple, Tex., is the third in a series of articles on the progress of various Texas soil-erosion projects. Some phases of the work discussed are terracing, strip cropping, crop rotations, and cover crops.

GRANDFIELD, C. O., and METZGER, W. H.

(3569)

RELATION OF FALLOW TO RESTORATION OF SUBSOIL MOISTURE IN AN OLD ALFALFA FIELD AND SUBSEQUENT DEPLETION AFTER RESEEDING. Jour. Amer. Soc. Agron. 28: 115-123. February 1936.

Describes an experiment at the Kansas Agricultural Experiment Station to determine the rate of restoration of moisture during fallow periods ranging from 1 to 5 years, and the rate at which this moisture was again depleted by a new seeding of the alfalfa. Results are presented in tables.

GRANTHAM, G. M., AND MILLAR, C. E.

(3570)

SANDY SOILS, METHODS OF MANAGEMENT. Mich. Agr. Expt. Sta. Spec. Bull. 248, 42 pp. illus. 1934.

Characteristics and methods of improving sandy soils are discussed. "In order to conserve soil humus and reduce the cost of operation, sandy soils should be kept compact and should be plowed and tilled as little as is consistent with good seed bed and proper weed control." Rotations of legumes, such as alfalfa and clover, and the use of green manure and cover crops are recommended to maintain humus and nitrogen content of the soil and to reduce the loss of plant food by leaching.

GRANTHAM, H. A.

(3571)

ROTATION OF CROPS BENEFITS THE FARM AND THE FARMER. Agr. Gaz. N. S. Wales 47: 133-134. March 1936.

The advantages of rotation include control of pests and diseases. The physical condition of the soil is improved. Rotation increases the soil's nitrogen content and checks soil erosion.

- HALE, G. A. (3572)
REDUCE EROSION BY CROP ROTATION. *Prog. Farmer* (Miss. Val. Ed.) 52: 18, illus. February 1937.
"Recent erosion research shows the most important reason cotton cultivation has depleted the soil . . . Several trials show that continuous cotton culture resulted in an average annual loss of 29 tons of top soil per acre while corn (the next most erosive crop studied) cultivation resulted in an annual loss of 13 tons of top soil per acre." Recommendation is made for planting winter legumes.
- HANEY, J. G. (3573)
SOIL EROSION AND MOISTURE CONSERVATION. *Northwest Farm Equip. Jour.* 50: 27-29. July 1936.
The writer describes soil-erosion control by systematic farming practices. Descriptions are given of the right implements essential for such conservation methods, including the plow, the "combine" plow seeder, the rod weeder, disk harrow, lister, subsoilers, packers, wide-space furrow opener, and manure and straw spreaders. "Every farmer must study his soil, and adopt a method of farming—crop rotation—machinery, etc., suitable to the character of his land."
- HAREBO, I. (3574)
HOW WE STOPPED SOIL BLOWING. *Mont. Farmer* 21: 3. March 1, 1934.
A method controlling soil blowing on a Montana dry farm is described by the farmer who proved it successful. The land was divided into 10-acre strips and divided into alternate strips of crop and fallow by north and south. His method of summer fallowing is described. He says that strip farming is useless unless neighbors cooperate.
- HARRISON, W. H. (3575)
DON'T BURN REFUSE OR DRY VEGETATION. *Rural New-Yorker* 95: 467. May 16, 1936.
Discusses value of turning under all grass, weeds, cornstalks, etc., for soil enrichment and describes method of making compost heap of manure and forest soil.
- HIGGINS, F. L. (3576)
SWEET CLOVER ON THE BEAVER CREEK WATERSHED. *Soil Conserv.* 2: 15-16, illus. July 1936.
Points out the value of sweetclover for pasture and soil improvement. "Experiments . . . show that the plowing under of six inches of sweet clover is equivalent to an application of 15 tons of manure per acre."
- HOLDEN, J. A. (3577)
CROP ROTATION UNDER IRRIGATION. *Nebr. Agr. Expt. Sta. Bull.* 190, 11 pp. 1923.
Experiments over an 11-year period are described, with principles and advantages of crop rotation together with cash returns per crop and rotation.
- HOPKINS, E. S., PALMER, A. E., AND CHEPIL, W. S. (3578)
SOIL DRIFTING CONTROL IN THE PRAIRIES PROVINCE. *Canada Dept. Agr. Pub.* 568 (2d rev. ed.), 51 pp., illus. [Ottawa.] May 1937.
Contains discussions of treatment of stubble land and various soil types, soil drifting, weed and insect control, crop rotation in relation to soil drifting, and machinery for the control of drifting soil. Among control measures recommended are strip farming, summer fallow, and cover crops.
- KEARNEY, WILL. (3579)
WHEAT MOISTURE. *Capper's Farmer* 48: 39, illus. February 1937.
Illustrates how the Peacock system of soil moisture conservation proved successful on a Colorado farm. "Under the Peacock system the land always is ready for precipitation, always protected against blowing."
- KERLE, W. D. (3580)
FALLOW EROSION. *Agr. Gaz. N. S. Wales* 40: 573-575. 1929.
The losses caused by fallow erosion and means of prevention are discussed. "There can be no doubt that one of the main contributing factors to soil erosion is forest denudation." The value of judicious cultivation

such as grass cover and contour plowing, is considered as are also the effect of the humus content and rotation as a means of soil improvement. The author concludes: "It will be recognized . . . that the problem of soil erosion on our fallows is one that cannot be remedied in a day, but only by a gradual process of maintaining and increasing the organic matter within the soil, and the adoption of common-sense methods of tillage."

- KIMBALL, M. H. (3581)
EROSION CONTROL AN IMPORTANT FACTOR. Calif. Cult. 81: 539, 554. October 27, 1934.

The problem of soil erosion in California suggests the planting of quick-growing cover crops and terracing. "There is a system of irrigation furrow construction which is exceedingly valuable for erosion control. When this system of furrowing is combined with a cover crop, protection to the orchard soil with considerable slope is almost complete. The furrowing system referred to is the so-called 'furrow basin' system of set-up. Briefly, it consists of a series of deep furrows put in on a contour. Across these furrows, by use of a special machine, field ditches are constructed and connections made between the bisected contour furrows resulting in a complete 'zig-zag' between the field ditches."

- KING, J. A. (3582)
SAVING THE SOIL FROM WASHING. Farm Engin. 5: 8. September 1917.

The writer describes this as "a lesson learned from my cornfield after a June freshet." The need for rotation cover crops is stressed and certain differences in soil washing are explained.

- LEONARD, C. D., AND STEWART, T. G. (3583)
KEEPING THE FARM AT HOME. Colo. Agr. Col. Ext. Cir. 97A, 8 pp., illus. July 1935.

"A good plant cover such as small-grain stubble, corn stalks, sorghum stubble or alternate strips of grain or sorghum stubble and row crops, is perhaps the most effective means of preventing soil drifting." Contour listing and terracing are advocated.

- LYLE, S. P. (3584)
SOIL EROSION CONTROL UPON FIELDS REMOVED FROM COTTON PRODUCTION. U. S. Agr. Adjustment Admin. 5 pp. 1934. [Mimeographed.]

Recommends and describes as control measures terracing, contour farming, and erosion-resisting crops.

- MILHOLLIN, R. M., AND ANTHONY, HAROLD G. (3585)
WATER SPREADING AT SAN ANGELO. Soil Conserv. 3: 35-37, illus. August 1937.

" . . . the moisture problem in the rolling plains [of Texas] is not so much one of insufficient precipitation as it is lack of those farming methods and practices developed specifically to ensure efficient utilization of the greatest possible amount of annual rainfall." Discusses practical methods to achieve this objective.

- MILLAR, C. E. (3586)
SAVING SOIL WITH CROPS. Mich. Farmer 187: 5, 24, illus. March 13, 1937.

"A well planned cropping system will contribute greatly toward maintenance of soil fertility." The results of long continued experiments with different cropping systems by the Ohio Agricultural Experiment Station and the University of Missouri are discussed. Strip cropping, contour farming, and permanent pasture are advocated.

- MILLER, M. F. (3587)
CROPPING SYSTEMS IN RELATION TO EROSION CONTROL. Mo. Agr. Expt. Sta. Bull. 366, 36 pp., illus. 1936.

A broad schematic plan is presented, indicating the general relationships between cropping systems and the grade and slope of the land. "It is well known that different crops vary widely in their influence upon erosion losses. Generally speaking, the clean tilled crops are less effective in controlling losses and the sod crops most effective . . ." Results of erosion measurements with recommendations for erosion control are given.

- MILLER, M. F., AND KRUSEKOPF, H. H. (3588)
THE INFLUENCE OF SYSTEMS OF CROPPING AND METHODS OF CULTURE ON SURFACE RUN-OFF AND SOIL EROSION. Mo. Agr. Expt. Sta. Research Bull. 177, 32 pp. 1932.
Describes an investigation covering a 14-year period, the object of which was to determine the influence of different systems of cropping and cultural treatment on surface run-off and soil erosion. The investigation was carried out on a poor quality of Shelby loam having an average grade of 3.68 percent.
- MOERDYK, J. L. (3589)
CROP ROTATION IN SOUTH AFRICA. Farming in So. Africa 11: 196-198, illus. May 1936.
Mentions early beginnings of the crop-rotation system and its use by the Romans. The author quotes from Varro who lived 2,000 years ago: "Certain crops are sown not so much for the yield obtained from them, but because they improve the soil." Advantages of crop rotations are stressed, and experiments on various government stations are described with their results.
- NEW HAMPSHIRE UNIVERSITY, EXTENSION SERVICE. (3590)
CONSERVATION PROGRAM ON FRUIT AND VEGETABLE FARMS. N. H. Univ. [Agr.] Ext. Cir. 200, 4 pp. 1937.
This circular outlines the program for orchardists giving advice on top dressing sods and reseeded of run-out sods.
- NEWMAN, J. S. (3591)
PROTECTION AND IMPROVEMENT OF WORN SOILS. S. C. Agr. Expt. Sta. Bull. 32, 12 pp., illus. 1897.
"It has been estimated that eighty percent of the injury to the cultivated soils of the cotton states on the effect of tillage, is attributable to surface washing." Clean culture, leaving the land to washing and leaching, and hill-side ditches are responsible for the impoverishment. Instructions for terrace building are given. Restoration of fertility by sowing peas and crimson clover, turning under of green crops, and crop rotations are among the measures recommended for renovating worn soils.
- NEWPORT, FRED C. (3592)
A CORDUROY COAT PROTECTS HIGH PLAINS FROM DROUGHT. Soil Conserv. 2: 139-140, 145, illus. January 1937.
This article deals with contour furrowing with particular reference to High Plains range lands. He says "furrowing is beneficial, regardless of the time of year it is done . . . spring furrowing nevertheless gives the grass its greatest opportunity to become quickly established."
- OSBORN, W. M. (3593)
ROTATION AND TILLAGE EXPERIMENTS AT THE LAWTON (OKLA.) FIELD STATION, 1917-30. U. S. Dept. Agr. Tech. Bull. 330, 34 pp. 1932.
The soils in southwestern Oklahoma differ widely in structure and composition, and erosion is a significant problem on most farms. This bulletin presents practical information on rotation and tillage experiments with a view to better control measures.
- PARKISON, R. H. (3594)
PROFITABLE CROP ROTATIONS INCLUDE MANY LEGUMES. Purdue Agr. 29: 61, 69. April 1935.
"The establishment of rotations containing legumes will increase the available supply of organic matter, improve soil tilth, structure, and retentiveness, reduce production costs per unit, distribute man and horse labor, and increase production per acre." Discusses rotations suitable to Indiana.
- PITTMAN, D. W. (3595)
ROTATIONS AND CROPPING SYSTEMS. Utah Agr. Expt. Sta. Cir. 103, 8 pp. 1934.
This circular discusses some of the more important cropping systems with their adaptations and limitations, advantages, and disadvantages.

RATLIFF, G. T., AND ATKINS, I. M.

(3596)

CROP ROTATION AND TILLAGE EXPERIMENTS AT THE SAN ANTONIO (TEXAS) FIELD STATION. U. S. Dept. Agr. Cir. 193, 39 pp. 1931.

"The rotation and tillage experiments here reported were conducted at the U. S. San Antonio Field Station, located in south-central Texas. The soil where these experiments were conducted is a heavy black clay loam . . . The detailed yields are given for each plot for each year."

REA, ROBERT.

(3597)

SAVED-MOISTURE MAKES CROPS. *Capper's Farmer* 47: 32, 75, illus. April 1936.

In contour farming in Greer County, Okla., it is considered most satisfactory to lay off rows to follow the nearest terrace, putting all short rows midway between the terraces. This reduces wind erosion.

ROCKIE, W. A.

(3598)

SERIOUS EROSION CAUSED BY HEAVY RAIN, JULY 30, 1931, NEAR COLFAX, WASH. U. S. Monthly Weather Rev. 60: 22-23, illus. January 1932.

"The damage done to the land through erosion by this heavy rain was directly related to the vegetation which covered any given field on that date. The summer fallow land eroded to plow sole but did not generally go below that line. Individual fields containing several hundred acres unquestionably lost as much as 2 inches of soil from their entire acreage." But all observations pointed to one fact, namely, "that vegetative growth is a most effective control of soil washing and of run-off moisture losses." No soil losses were found in fields covered with growing vegetation.

(3599)

UTILIZATION OF CROP RESIDUE. *Northwester* 3: 1. May-June 1936.

"The greatest loss of soil through both water and wind erosion occurs on fields from which the stubble has been burned. If any real progress is made under the Agricultural Conservation program, it will be necessary to stop the burning of straw, stubble, and crop residues, and incorporate them into the soil."

ROGERS, R. H., AND ELLIOT, F. F.

(3600)

TYPES OF FARMING IN SOUTH DAKOTA. *S. Dak. Agr. Expt. Sta. Bull* 238, 70 pp., illus. 1929.

An outline and description of 13 type-of-farming areas, together with a discussion of important factors that have determined the type of farming conducted in each area, constitutes part of this publication. Special tabulations of census data make possible a specific analysis of present farming systems. "Soil type has not been the dominant factor in determining the types of farming in South Dakota, but it unquestionably has an influence in each area. The supply of organic matter in the soil is steadily decreasing under the usual systems of farming; and there is an increasing tendency of soils to drift in high winds during dry periods. This tendency to erosion by wind and water may be overcome by plowing under a sufficient amount of organic matter."

ROSA, J. T.

(3601)

CONTROLLING SOIL MOISTURE FOR VEGETABLE CROPS IN MISSOURI. *Mo. Agr. Expt. Sta. Bull* 204, 8 pp. 1923.

"The effect of irrigation and of mulching on yields of tomatoes, peppers, eggplants, and cucumbers are shown. Increased yields from irrigation are thought to justify the use in Missouri of overhead irrigation for intensive cultivation of valuable crops . . . The effects of the mulch are attributed to reduction of soil temperature and decrease in fluctuations of the soil moisture content."

RUSSELL, E. J., AND VOELCKER, J. A.

(3602)

FIFTY YEARS OF FIELD EXPERIMENTS AT THE WOBURN EXPERIMENTAL STATION. 392 pp., illus. London, New York [etc.], Longmans, Green & Co. 1936.

Partial contents: The Continuous Growth of Wheat on the Same Land, pp. 26-44; The Continuous Growth of Barley on the Same Land, pp. 45-54; Green Manuring and Green Cropping, pp. 55-63; Grass and Other Fodder Crops, pp. 64-77; Soil Deterioration Under Conditions of Continuous Cropping, pp. 236-260; The Uncertainty of Green Manures, pp. 302-305.

- RUSSELL, J. C.** (3603)
 MAKING THE MOST OF RAINFALL THROUGH SOIL AND CROP MANAGEMENT. Nebr. State Bd. Agr. Rept. 1935: 199-206. 1935.
 To offset run-off losses the author recommends contour farming and various tillage practices. The use of windbreaks is also suggested.
- RUZIČKA, C. H.** (3604)
 CROP ROTATION AND TILLAGE METHODS. N. Dak. Sta. Bull 158, pp. 65-83. 1922.
 "Experiments in crop rotations and tillage methods, in cooperation with the Office of Dry Land Agriculture, U. S. D. A., since 1909 gave evidence that crops in a rotation, including corn or a cultivated crop, are more economical than continuous or haphazard cropping. Grains on fallow do not give large enough returns over yields after corn to warrant fallow, except as an emergency or temporary measure. Small grains after small grains of a different kind have given satisfactory yields in the rotations . . ."—Expt. Sta. Rec. 48: 226. 1923.
- S., R. E.** (3605)
 PREVENT EROSION. Calif. Cult. 83: 214. March 14, 1936.
 The author discusses loss of vegetative cover through erosion and offers suggestions for crop rotations on farmlands and the broad flat terrace type of cultivation for slopes.
- SCHOFFELMAYER, V. H.** (3606)
 CAPTURING AND STORING RUN-OFF WATER. Cotton Trade Jour. (Internatl. ed. 9) 17: 113-114, illus. May 1, 1937.
 Experiments show that the application of moisture conserving practices to the cotton problem of the southwestern part of the United States increases crop yields.
- SEVERANCE, GEO., HUNTER, BYRON, AND EKE, PAUL A.** (3607)
 FARMING SYSTEMS FOR EASTERN WASHINGTON AND NORTHERN IDAHO. Wash. Agr. Expt. Sta. Bull. 244, 83 pp., illus. July 1930.
 Presents six different cropping systems, especially applied to those portions of the wheat area of eastern Washington and northern Idaho where the average annual precipitation exceeds 18 inches. The comparative merits of the systems are shown in tabular form. One section is devoted to crop and livestock farming.
- SEXTON, H. D., AND DISEKER, E. G.** (3608)
 A PROPOSED SYSTEM OF EROSION CONTROL. Agr. Engin. 14: 150-151, illus. June 1933.
 Results of erosion control conducted at the Alabama Agricultural Experiment Station have shown that terracing alone will not control erosion during those months while the land is occupied by cultivated crops. "In this paper are reported the results of some preliminary studies on the use of strip-cropping for erosion control, a method of running rows to avoid an excessive number of short rows, and the use of machinery on hillside land."
- SINCLAIR, J. D.** (3609)
 FORESTRY IS AN AID TO THE FARMER IN CONTROLLING EROSION. U. S. Dept. Agr. Yearbook 1932: 226-228, illus. 1932.
 "Preventive measures such as terracing, use of cover crops, and deep cultivation may be very effective in checking erosion on slopes up to 10 or 15 percent. On steeper slopes and on areas subject to severe washing, or on land already in gullies, a stable vegetative cover is necessary. A good grass sod or covering of vines may be sufficient, but trees are one of the most effective means of preventing or controlling soil movement." The author particularly stresses the value of black locust.
- SOULE, A. M.** (3610)
 PREVENTING SOIL WASHING. South. Agr. 34: 1, illus. December 1, 1904.
 The author, in outlining the causes of soil washing recommends (1) a deep and thorough cultivation to prevent washing and to increase the storage capacity for water, (2) the planting of leguminous crops, and (3) the planting of a cover crop.

SPEIR, R. W.

(3611)

HOLDING THE SOIL. *Mont. Farmer* 23: 5. May 1, 1936.

The author, a farmer in Pondera County, Mont., tells how he controlled soil blowing on an 80-acre dry-land summer-fallow field by strip cropping with sod, grain, and summer tillage.

SPILLMAN, W. J., AND OTHERS.

(3612)

DIVERSIFIED FARMING IN THE COTTON BELT. U. S. Dept. Agr. Yearbook 1905: 193-218. 1906.

In discussing conditions on the South Atlantic coast, Spillman recommends the use of terracing to control erosion on hillsides. Agricultural conditions in Alabama and Mississippi are described by M. A. Crosby, who concludes: "It is apparent to all who are familiar with southern conditions that if the depletion and the washing away of the soil on southern farms is to be checked, a system of farming must be put into practice which will increase the organic content of the soil. As has been stated, this may be done either by a system of crop rotation involving the use of leguminous plants and green manures or by feeding a large portion of the crops on the farm and returning them to the soil in the form of animal manures."

STEWART, P. H., AND GROSS, D. L.

(3613)

MANAGEMENT OF NEBRASKA SOILS. *Nebr. Agr. Col. Ext. Cir.* 133, 39 pp., illus. 1936.

The authors discuss soil texture and structure, plant food elements, methods for soil maintenance, soil moisture, and special soil problems. Among erosion-control practices strip farming, contour farming, and terracing are stressed.

TEUTSCH, W. L.

(3614)

STRAW FARMING. *Capper's Farmer* 48: 8, illus. June 1937.

"Increasing seriousness of the loss of soil from wind and water erosion has caused many wheat farmers of the Pacific Northwest to adopt 'straw farming' methods. Straw farming means careful preservation of the crop residue, straw and stubble, turning it down so as to leave it on or near the surface, adding organic matter to the soil, increasing moisture holding capacity and in substantial measure preventing the soil from washing or blowing . . . The approved 1937 fashion in summer fallow for the Pacific Northwest is trashy fallow. It is as free from weeds as the old style fallow, but it is by no means free of 'trash.'"

THATCHER, L. E.

(3615)

SEEDING STUBBLE LAND TO GRASS. GOOD STANDS MAY BE OBTAINED AFTER HARVEST. *Ohio Farmer* 178: 3, illus. July 4, 1936.

"The success of new seedings will depend upon the conservation of the moisture left in the soil after small grain harvest and the retention of any rainfall that comes during the summer. Disking wheat or rye stubble soon after harvest contributes to this end by establishing a soil mulch which retards evaporation and, if rain falls, prevents run-off and favors its absorption by the soil."

THIEM, G.

(3616)

FARMING AGAINST THE SLOPE. *Ill. Agr. Assoc. Rec.* 14: 4-6. December 1936.

A description of contour and strip farming on rolling farm lands in Carroll County, Ill., "Liming, alfalfa, and terracing on washing lands go far toward holding the soil."

THROCKMORTON, R. I.

(3617)

SOIL TREATMENT AS SAFEGUARDS AGAINST DROUGHT. *Kans. State Bd. Agr. Rept.* 66: 61-69. 1937.

A discussion on terracing, contour farming, and pasture management. Data are given on various types of tillage implements including the basin attachment for the lister.

UHLAND, R. E.

(3618)

CORN GIVES WAY TO DIVERSIFICATION. *Soil Conserv.* 1: 15. April 1936.

"Our farmers see the advantage of making a temporary sacrifice in favor of a good soil-building program."

- UNITED STATES SOIL CONSERVATION SERVICE. (3619)
 AGRONOMY HEAD TOURS PROJECTS AND REPORTS TO CHIEF. Soil Conserv. 2:
 96-101, illus. November 1936.

The author tells how farmers are using vegetation to control erosion, describing conservation work in New Jersey, Maryland, Ohio, Illinois, Minnesota, North Dakota, Wyoming, Washington, Idaho, Kansas, and Oklahoma.

- VINALL, H. N. (3620)
 FORAGE CROPS FOR THE SAND-HILL SECTION OF NEBRASKA. U. S. Bur. Plant.
 Indus. Cir. 80, 23 pp., illus. 1911.

This circular reports investigations consisting of cooperative experiments and a study of successful farming practices for the benefit of settlers filing claims after the passage of the Kinkaid homestead law. Location, topography, and climate of sand-hill areas, native vegetation, and crop limitation are among the subjects treated. Recommendations for suitable crops for this section are made.

- WEIR, WILBERT W. (3621)
 SOIL PRODUCTIVITY AS AFFECTED BY CROP ROTATION. U. S. Dept. Agr. Farmers'
 Bull. 1475, 22 p., illus. 1926.

The purpose of this bulletin is to emphasize the value of crop rotation in farming economy and to stress the principles of rotation in their relation to the maintenance of soil productivity and to soil improvement. Important data are given.

- WIMER, D. C., AND HARLAND, M. B. (3622)
 CULTIVATION OF CORN, WEED CONTROL VS. MOISTURE CONSERVATION. Ill. Agr.
 Expt. Sta. Bull. 259, pp. 175-196, illus. 1925.

The principal and greatest value of corn cultivation on brown silt loam is the destruction of weeds. "Since cultivation is the only practical method of controlling weeds, the depth and frequency of corn cultivation should be determined by their depth. Proper cultivation should kill the weeds with minimum injury to the corn roots . . . The data and brief discussions presented in this bulletin are intended to be of assistance in developing the principles underlying the successful cultivation of corn and are not intended as recommendations of specific methods or particular implements."

- WOOD, I. D. (3623)
 THE FUTURE OF MOISTURE CONSERVATION. Agr. Engin. 14:152. June 1933.

"It is my opinion that future developments in the field of moisture conservation, so far as the agricultural engineer is concerned, will come with the further development of the terrace and of contour farming." The author describes a machine in the experimental stage capable of digging 10,000 holes per acre, each having a capacity of 3 gallons.

- VALUE OF TERRACING, CONTOUR FARMING, STRIP FARMING AND OTHER PRACTICES
 IN CONSERVING PRECIPITATION. Nebr. State Bd. Agr. Rept. 1935: 190-199,
 illus. 1935. (3624)

"By a properly designed system of terraces, combined with contour farming, soil and moisture losses can be reduced to a minimum. The land owner who would follow a careful rotation system on land farmed in this manner should be able to maintain a high state of fertility and conserve enough moisture to guarantee much higher yields than is ordinarily obtained on such land."

- ZINN, W. D. (3625)
 FARM PRACTICE: EROSION CONTROL. Pa. Farmer 114: 3. May 23, 1936.

"The farmer who is not applying lime and commercial fertilizer is the one with whom these government officials should spend their time, but let me say confidentially that I consider it a reflection on our profession that the government should consider it necessary to give us this information." Various soil-building crops are recommended.

- FARM PRACTICE. Pa. Farmer 116: 3, 15. February 13, 1937. (3626)

Crop rotation as practiced by George Washington is reviewed along with a brief history of his farming practices and land acquisition.

VEGETATION IN GENERAL

ANONYMOUS.

(3627)

CENTPEDE SOD FOR TERRACE OUTLETS. Fert. Rev. 12: 16. January-February 1937.

"Centipede sod is a prostrate grass and knits into a firm sod that is well tied to the soil with a heavy fibrous root system" and has been found of value at the S. C. S. demonstration project at Graceville, Fla.

(3628)

DALLIS GRASS. Reedy Creek Farm Coop. 3: 11. January 1936. [Mimeographed.]

Dallis grass, a native of South America, is being tried out in West Virginia in the hope that it may prove of practical value for erosion control and other purposes.

(3629)

FORAGE CROPS HOLD SOIL. Wash. Farmer 70: 11. March 1935.

Seed mixtures to check erosion are recommended and their merits discussed. The recommendations are the result of studies conducted at the soil erosion project in Whitman and Latah Counties, Wash.

(3630)

HUBAM CLOVER FOR EROSION CONTROL. Farm and Ranch 56: 24, illus. March 1, 1937.

Hubam clover planted on strips has been found to give "the soil a loose honeycomb effect which encourages aeration of the soil and is especially desirable from a moisture absorption standpoint."

(3631)

INTRODUCTION OF PLANTS TO PREVENT SOIL EROSION. Science 82: 344. October 11, 1935.

"Since the spring of 1934 the Department of Agriculture has had three groups of plant collectors in Asia gathering seeds of grasses and other plants which might some day protect the Great Plains against the effects of drought and erosion." Preliminary observations and results from testing these seeds are given.

(3632)

KOREAN LESPEDEZA. Reedy Creek Farm Coop. 3: 10-11. January 1936. [Mimeographed.]

A discussion of the legume, Korean lespedeza, as a valuable crop for erosion control, pasture, and rotation. The article includes directions for the care of seed and planting.

(3633)

KUDZU, A FORAGE CROP AND SOIL BINDER. Cannonville Soil Conserv. News, pp. 1-3. April 1936.

Discusses kudzu cultivation, yield, and value for erosion control in gullies and on steep slopes.

(3634)

KUDZU HAS A PLACE. Prog. Farmer (Ga.-Ala. Ed.) 52: 50. January 1937.

Figures are given which indicate that "kudzu would be profitable on thousands of farms" because of its value as a feed and soil-improvement crop.

(3635)

MEADOW STRIPS IN EROSION CONTROL. Cannonville Soil Conserv. News, pp. 3-4. April 1936.

Gives detailed directions on meadow strips, pointing out advantages of this type of outlet over outlet channels fortified with concrete spreaders.

(3636)

PERSIAN CLOVER—NEW VARIETY FOR SOUTH. Seed World 40: 9. August 28, 1936.

This annual clover, also called Shaftel, is used as a forage and as a soil-improving crop in northern India and in parts of Persia. It was first introduced in Louisiana about 1924.

ANONYMOUS.

(3637)

PLANTS CALLED "WEEDS" OFTEN ARE SOIL BUILDERS. *Fert. Rev.* 11: 7. April-May-June 1936.

Weeds play an important part "in increasing yields by improving soils, on idle land or where they do not compete directly with a crop for moisture and fertility." Weeds, in some instances, are found to be soil builders and savers.

(3638)

SEARCH FOR PLANTS TO CONTROL EROSION. *Science* 80: 65-66. July 20, 1934.

"Plant explorers of the U. S. Department of Agriculture are now making an intensified search at home and abroad for plants that will help to control soil erosion." Parties will visit the Union of Soviet Socialist Republics and Japan, and others will search the western half of the United States. A party will also visit Russian Turkestan, Persia, and Afghanistan to look for soil-holding plants which show possibilities for the southwestern part of the United States.

(3639)

SOIL EROSION. *Trop. Agr. [Ceylon]* 77: 140-141. September 1931.

"Though not so effective as a ground cover plant more use can be made of bush plants than trees in the checking of soil erosion . . . It remains then to arrive at an arrangement of planting which will be most effective in checking erosion and to choose the most suitable plant for the purpose . . . The best way to make use of bush plants for this purpose is to plant them in thick contour hedges . . . Such hedges are frequently planted above drains and roads and undoubtedly help in checking erosion . . . The considerable litter of leaves shed by some bush plants . . . is of assistance in checking erosion."

(3640)

SOYBEANS CAN ENCOURAGE EROSION. (Editorial.) *Farm and Ranch* 55: 8. May 15, 1936.

This editorial states that soybeans must be planted in contour rows to prevent washing of the land during heavy rains. "Soybeans do improve soil fertility, especially if the vine is plowed under . . ."

(3641)

TO MAKE THE DESERT GREEN. *Ariz. Producer* 13: 1, 12. December 1, 1934.

The writer describes operations at the southwestern stations, under the Division of Plant Exploration and Introduction, United States Bureau of Plant Industry, to supply seeds and nursery plants for revegetating eroded lands. Among the most satisfactory soil binders used are the karroo bush, African watermelons, Asiatic and Australian grasses, and Russian mulberry. "The American barberry, buffalo berry, and wild plum are to be planted far and wide over the Navajo Reservation, as will a certain kind of oak tree that produces a small acorn which is eatable without leaching out the tannin. Forage and food plants are secondary, but important. Preference will be given, of course, to those that are soil binders as well as edible for man and beast."

(3642)

VEGETATION FOR PROTECTION OF SLOPES FROM EROSION. *Engin. and Contract* 68: 526. December 1929.

Vegetation suited to the conditions existing where slopes require protection is advocated. This consists of transferred sod, vines, myrtle, and dwarf species of shrubbery.

(3643)

VEGETATION IS TO THE SOIL WHAT SKIN IS TO THE BODY. *Better Crops with Plant Food* 20: 34. March 1936.

The writer quotes from an interview with H. H. Bennett: "Some of the steeper and more erosive land must be in trees or grass. These crops anchor the soil. Like the skin on our bodies they protect the earth from the disease of erosion."

ANONYMOUS.

(3644)

WILL YOUR FARM DISAPPEAR? Wallaces' Farmer 59: 633, illus. November 10, 1934.

On soil erosion in Iowa. Suggests, as a preliminary control measure, a cropping system in which corn plantings are decreased, and legumes and hay increased.

ADAMS, R. L.

(3645)

COST FINDING FOR NURSERYMEN. Amer. Nurserymen 64: 5. October 1, 1936.

Procedure for determining costs in the nursery, and purpose when established, outlined before California convention of the American Association of Nurserymen.

AIKMAN, J. M.

(3646)

THE RELATION OF THE STAGES OF PLANT SUCCESSION TO SOIL EROSION. Iowa State Col. Jour. Sci. 9: 379-389, illus. 1935.

"The purpose of this paper is to report the results of a series of observations made upon a number of sites representing stages in plant succession, to determine the extent of changes induced by the plants which may be effective in preventing erosion." Habitat changes induced by the development of vegetation, which may be considered most important in the prevention of erosion, were investigated.

ALEXANDER, E. D.

(3647)

CRIMSON CLOVER FOR FERTILIZER, FEED, AND SOIL PROTECTION. Ga. Agr. Col. Ext. Bull. 452, 12 pp., illus. 1935.

"Crimson clover can be utilized in many ways. Its first and greatest value is its use as a soil conservation and improvement crop."

AUSTIN, WAYNE.

(3648)

SEEDING NATIVE GRASS IN CONTOUR FURROWS. Soil Conserv. 2: 83, illus. October 1936.

On the use of a crank duster for seeding native grasses in Colorado.

BAILEY, R. Y.

(3649)

HEAVY DUTY VEGETATION FOR EROSION CONTROL. Soil Conserv. 3: 42, 46, illus. August 1937.

Recommends the use of perennial grasses and *Lespedeza sericea*, alfalfa, and kudzu. Bermuda grass is suggested for use in primary channels where the volume and velocity of the water require the greatest vegetative protection.

KUDZU FOR EROSION CONTROL. The Land, Today and Tomorrow 2: 15-18, illus. March 1935.

"Kudzu is probably the most useful plant for erosion control in the Piedmont section of the Southeast. This plant is a perennial viny legume which grows vigorously on practically all types of soil found in the Piedmont section . . ." Directions for planting are given briefly.

BARTON, L. V.

(3651)

GERMINATION OF SOME DESERT SEEDS. Contrib. Boyce Thompson Inst. 8: 7-11. January-March 1936.

Presents results of a study on the effect of storage on the germination temperature required by seeds of some winter annuals. "In the present study we are especially concerned with winter annuals . . . Such winter annuals are characteristic of southern Arizona and extend into Mexico. Some of the more important ones, among which are *Plantago fastigiata*, *Lesquerella gordonii*, and *Lepidium lasiocarpum*, often form a dense cover and are valuable for spring grazing."

Literature cited at end of article.

BEELEER, M. N.

(3652)

BACK TO BUFFALO GRASS. Capper's Farmer 48: 13, 49, illus. June 1937.

Directions are given for establishing buffalo grass pastures by transplantation. "In regions where soil blowing may occur, sods may be planted in furrows, and rows may be spaced wide enough apart for planting Sudan grass between them. This will protect the sods from coverage or from

blowing out not only during the growing season, but afterward if the grass or a high stubble is left in the field."

- BENNETT, H. H. (3653)
GRASS SAVES BOTH SOIL AND WATER. *Agr. Leaders Digest* 17: 9-10. October 1936.

"Erosion control practices on Soil Conservation areas in eastern Texas were about 95 percent effective in withstanding the impact of the heavy spring rains. The demonstrations clearly indicate the value of a coordinated program and moisture program." Results of soil- and water-loss measurements are given which show that fields planted to Bermuda grass were least damaged.

- (3654)
RELATION OF EROSION TO VEGETATIVE CHANGES. *Sci. Monthly* 35: 385-415, illus. November 1932.

"This paper is not primarily concerned with the effects of normal or natural erosion, except as a basis for comparison. It pertains to changed physical, chemical, and biologic conditions resulting from abnormal erosion, the accelerated soil washing following man's activities, his free use of ax and plow and the overcrowding of livestock upon open ranges." The writer states that "this paper undertakes to emphasize . . . profound erosion produced alterations in the vegetative aspects of the land. The subject can not be covered in detail at this time; its importance as a geographic, edaphic, and economic problem only can be stressed here." Data accumulated at the various regional soil erosion experiment stations and results of soil surveys and erosion surveys are given with tables and diagrams.

- (3655)
SOIL-EROSION STUDIES SHOW VEGETATION HAS DOMINANT ROLE. U. S. Dept. Agr. Yearbook 1934: 322-327. 1934.

"Data secured by the Bureau of Chemistry and Soils from various sources are summarized, showing that vegetation in the form of forest or in thick grasslike growth is an inexpensive, permanent cure for erosion. In one form or another it can be used on all kinds of land, on any degree of slope, and under all varieties of climate where there is heat and rain enough to make plants grow."—*Expt. Sta. Rec.* 72: 111. 1935.

- BLAIR, E. C. (3656)
REPLACEMENT CROPS TO PLANT. *South. Planter* 97: 16, 23. January 1, 1936.

Legumes to improve the various soils included in 500,000 acres of North Carolina to be retired under the agricultural adjustment program are suggested. The best fertilization and soil inoculation methods are discussed, and a table is included pointing out varieties, dates for planting, and seeding rates per acre.

- BOSMAN, F. H. (3657)
WATER IN RELATION TO PLANT GROWTH. *Farming in So. Africa* 11: 233-235. June 1936.

A paper read at the field husbandry conference at Potchefstroom dealing with water as it affects plant growth, in the light of certain experiments being conducted at the Grootfontein School of Agriculture. The rates of transportation in relation to plant growth is an important factor in the interpretation of the results obtained.

- BOSS, ANDREW (3658)
MORE AND BETTER GRASS. *Farmer* 54: 5, 27. April 25, 1936.

The author suggests various combinations of grasses and legumes, in an effort to be helpful to those who take advantage of the new soil program which, in effect, places a premium on good farming.

- BREITHAUP, L. R. (3659)
GRAINS FOR THE DRY LANDS OF CENTRAL OREGON. U. S. Dept. Agr. Farmers' Bull. 800, 22 pp., illus. 1917.

"This bulletin discusses the production of small grains on nonirrigated lands in central and southeastern Oregon at elevations between 4,000 and 5,000 feet . . . [and] gives general information, based partly upon experiments at the Harney Branch Experiment Station at Burns, Oregon."

BRESSMAN, E. N.

(3650)

BROME, A PALATABLE DRY-WEATHER GRASS TAILORED FOR THE PRESENT SWING TO PASTURE CROPS. *Successful Farming* 35: 17, 32, illus. August 1937.

Brome grass is drought-resistant, palatable, nourishing. "This discussion concerns the species commonly known as smooth brome grass, *Bromus inermis*, sometimes known as Hungarian brome grass . . . It must be kept in mind that today the chief value of brome is for pasturage rather than hay."

BUCHANAN, C. B.

(3661)

OREGON GROWN LEGUME SEEDS FOR THE SOUTH. *Agr. Bull* [Atlanta, Ga.] pp. 1, 20. Spring quarter, 1936.

"Owing to climatic and soil conditions, the Pacific Northwest, and especially the Willamette Valley of Oregon, is very favorably adapted to the growing of seed of the various vetches, Austrian winter peas and rye grasses for the use of Southern farmers. Owing to these conditions the western Oregon district has become a large source of domestic supply of these seeds. The Cotton Belt of the South has found that the use of these crops as winter cover crops for putting humus and nitrogen into the soil and for the prevention of soil erosion is a very desirable and profitable practice."

BUETOW, W. C.

(3662)

CHOICE OF GRASSES TO PROTECT ROAD EMBANKMENTS FROM EROSION. *Engin. News-Rec.* 79: 216. August 2, 1917.

"Different kinds of soil require a certain kind of grass or a combination of several kinds." Advice is given on this subject.

BULLOCK, D. M.

(3663)

ATRIPLEX SEMIBACCATA AS INFLUENCED BY CERTAIN ENVIRONMENTAL CONDITIONS. *Ecology* 17: 263-269, illus. April 1936.

The writer claims that as a soil binder *Atriplex semibaccata* is particularly efficient. Because of its salt content and succulence it is slow burning. It has been planted by the California Forest Experiment Station as a cover on firebreaks where invasion of the annual grasses constitutes a serious fire hazard during the dry season. Illustrations show coastal and ravine locations of *A. semibaccata*.

BUTLER, E.

(3664)

LEGUMES TO FIT WIDE NEEDS HAVE BEEN INTRODUCED TO AMERICA SINCE 1886. *Prog. Farmer* 51: 38-39, illus. February 1936.

The author enumerates and discusses the many legumes, native and imported, which can be profitably planted in the United States for crops and soil building.

C., W. Jr.

(3665)

VEGETATIVE METHODS OF EROSION CONTROL. *Dakota Zephyr* 2 (2): 14-15. March-April 1936. [Mimeographed.]

The author recommends a definite, carefully planned rotation of crops as one of the safest and most economical methods of insuring the continuance of high production and of controlling erosion. This should include planting of legumes or other permanent hay or pasture crops to be followed by cultivated and drilled crops. Such a rotation builds up the soil, controls weeds, and furnishes sufficient organic reserves which act as a check to the tearing away of the soil by erosion.

CALL, L. E.

(3666)

NEW CROPS FOR THE GREAT PLAINS REGION. *Midwest. Conf. Agr. Indus. and Sci. Condensed Proc.*, pp. 17-22. 1937.

The only crops that are well adapted to the unirrigated section of the southern Plains are wheat and sorghums. The latter afford excellent protection to the soil during the winter and spring months when blowing occurs. "If industrial uses could be found for a part of this potential grain sorghum production, it would aid in bringing into more rapid use those practices that are essential for the control of soil blowing." Not examined.

CARNES, ERNEST.

(3667)

VEGETATIVE CONTROL IN SOIL CONSERVATION. Agr. Engin. 17: 341-342. August 1936.

Discusses studies completed and studies in progress by the Soil Conservation Service and cooperating agencies in soil mapping, indicating slope, degree of erosion, and soil type, on each farm acre, together with present use of the land, for determination of required planting projects for erosion control. The author presents, in detail, results of experiments to determine value of lespedeza in soil conservation and land improvement; and to determine yield of cotton following lespedeza as compared with cotton following cotton.

CARRIER, LYMAN.

(3668)

GRASS IN SOIL EROSION CONTROL. U. S. Soil Conserv. Serv. SCS-TP-4, 15 pp. 1935. [Mimeographed.]

This paper stresses the advantages of sod cover to control erosion. Grasses useful in controlling erosion are listed as bluegrass, Kentucky bluegrass, Canada bluegrass, orchard grass, timothy, ryegrass, and western range grass.

CARTER, JOHN, JR.

(3669)

CROP PRODUCTION IN NORTHEASTERN NEW MEXICO UNDER SEVERE SOIL-BLOWING CONDITIONS. N. Mex. Agr. Expt. Sta. Bull. 243, 15 pp., illus. 1936.

The author divides crops into two groups: (1) those from which a crop of grain or forage may reasonably be expected to be harvested; and (2) those from which only protection to the soil against wind erosion is expected. "The surest dry-farming crops for the section under discussion are the sorghums." Sudan grass is recommended for forage.

CARTER, W. T.

(3670)

PLANT SPECIES ADAPTED TO THE SOUTHERN PRAIRIES AND GREAT PLAINS. Amer. Soil Survey Assoc. Bull. 17: 127-131. 1936.

A brief outline of the major plant communities and the important native species of the various southern prairies and plains soil groups. A sketch map of plant species is included.

CATES, J. S.

(3671)

AMERICA GOES TO GRASS. Country Gent. 106: 21, 34-35, illus. July 1936.

The growth and development of experiment with the 25 new winter annual legumes of the clover family brought in from the Near East and The Union of Soviet Socialist Republics by Westover and Enlow, with special reference to Persian clover which is rapidly becoming established in the lower South, is sketched. Experiments with Korean lespedeza (No. 19604) to determine its value as a soil-building legume in the Corn Belt are outlined. Mention is made of the work of the section of agronomy, Soil Conservation Service, in developing new strains of grasses suitable for erosion control in the western part of the United States.

(3672)

BUILDING THE TEMPLE. Country Gent. 107: 7-8, illus. August 1937.

Research in grasses. Explains why better grasses are needed for better agriculture and for better protection against erosion. Native and foreign grasses are listed.

(3673)

GRASS BREEDING IN WALES. Country Gent. 106: 5-6, 79, illus. February 1936.

A description of a visit to Wales and of the grass-breeding work at the Institute of Plant Breeding at Aberystwyth. No new species of grass are involved in the successful breeding operations but "the grasses, new strains of which are giving the amazing results I have outlined, are merely common everyday things like orchard grass, ryegrass, redtop, timothy, white clover, and a few other species, all well known on American farms." For the real foundation of a pasture these workers depend on one of their special strains of white clover. "The second big conclusion from this advanced work . . . is that perennial ryegrass represents a species of greater promise than any other of the many grass kinds . . ."

CATES, J. S.

(3674)

MISSOURI BUILDS A NEW AGRICULTURE. Country Gent. 106: 12-13, 76. October 1936.

The developing and fitting together of a group of new-type crop plants into a new system of agriculture is explained. The system, designed and developed by Etheridge and Helm of the Missouri State University, was "built in the main around Korean lespedeza as what might be called the key crop." This system "keeps the land always covered with a mat of plant growth and so eliminates erosion; stops it dead in its tracks, in fact."

(3675)

NEW SOD CROPS. Country Gent. 105: 8, 72-73, illus. June 1935.

"This is a tale of new grasses of great promise—grasses from widely scattered lands . . . It became apparent to all that under clean tillage with a minimum of sod—and in many vast areas no sod at all—the soil was washing down to the sea. Studies of the problem soon made it plain that our only salvation lay in a vastly increased acreage of sod crops."

(3676)

TRIUMPH OF THE ORPHAN. Country Gent. 108: 18, 82-83, illus. November 1936.

An account of *Lespedeza sericea*, native to eastern Asia, and a new crop plant of the forage group which "offers to banish poor land in a substantial area of America." It is pointed out that the Soil Conservation Service seeded 50,000 pounds of *L. sericea* last year on badly eroded areas. Experiments at the west Tennessee station at Jackson are referred to particularly.

(3677)

CHIERA, ALBERT.

DAMS THAT GROW. Soil Conserv. 1: 11, 13, illus. November 1935.

Discusses the methods used by soil conservationists in Italy and states that dams are generally inadequate unless augmented by vegetative covering and other erosion-control practices. A brief description is given of the construction of wattles or fascines (brush dams).

(3678)

HALTING ITALY'S SHIFTING SANDS. Soil Conserv. 1: 14-15, illus. January 1936.

Comment on vegetative control in Italy.

(3679)

CLEMENTS, FREDERIC E.

PLANT SUCCESSION AND HUMAN PROBLEMS. Carnegie Inst. Wash. News Service Bull. 3: 241-248, illus. December 29, 1935.

This bulletin is in two parts. In part I, entitled "The Nature and Role of Plant Succession," the intimate connection between erosion and plant life is shown. In part II, entitled "Application to Human Needs," it is shown that plant communities as indicators furnish the most satisfactory method of determining the best use of the land. The control of watersheds in the fight against erosion and flood is stressed. Various control works in Colorado and California are described and illustrated.

(3680)

CLOVER, E. U.

VEGETATIONAL SURVEY OF THE LOWER RIO GRANDE VALLEY, TEXAS. Madroño 4: 41-66, illus. April 1937.

"The erosional valley of the Rio Grande begins at Peñitas and extends through Zapata County. Numerous arroyos drain this part of the area, and the rough, broken region where they join the river is known as the 'Breaks of the Rio Grande.'" The writer's survey of the vegetation of the Lower Rio Grande Valley is based upon field studies "extending over most of the four seasons . . . The Rio Grande Valley is of much interest botanically because plants representing western desert, northern, coastal, and tropical floras are found in a relatively small area."

(3681)

VEGETATIONAL SURVEY OF THE LOWER RIO GRANDE VALLEY, TEXAS. III. Coastal climax associations. Madroño 4 (3): 77-100, illus. July 1937.

"This area includes the sandy beach, sand dunes (*medaños*), salt flats (*badilla salitrosa*) and the salt grass region known as the *sacahuistal*."

Beach and sand dune (shifting and permanent dunes) vegetation is listed, and the relations of edaphic factors and geological formations to plant distribution are discussed. A great number and variety of species collected in the lower Rio Grande Valley are listed.

COLPEN, M. G. (3682)

RECOMMENDED PLANTS. Amer. Nurseryman 64: 10-11. November 1, 1936.

"*Jasminum Beesianum* has promise of becoming a good, medium-low ground cover plant, which can be used for holding banks. It is quite hardy in Maryland, and the branches root heavily wherever a joint touches the ground."

CONARD, HENRY S. (3683)

MOSES AND SOIL EROSION. Iowa State Col. Jour. Sci. 9: 347-351. 1933.

"If erosion does not begin, it will not proceed. Only on this basis can such small plants as the mosses be considered as agents in the arrest of soil erosion . . . That they do function very extensively in checking primary sheet erosion is perfectly obvious." In his summary the writer states that mosses prevent erosion by catching the run-off water and suspended soil, and by matting the soil together and covering it so that it does not move; that this is accomplished by the mat of protonema, rhizoids, and stems; that valuable moss cover is delicate and must be protected; and that the cultivation of mosses is practiced on Long Island, and suggestions are made for choice of species and procedures according to ecologic needs and conditions. A table of significant moss species for Iowa is given.

Accompanied by bibliography.

CRIDER, F. J. (3684)

OBSERVATIONAL PLANTINGS IN THE NURSERIES. Soil Conserv. 2: 146-147, illus. January 1937.

The author states that one phase of work of the soil conservation nursery program consists in "finding and bringing into use new plants which have outstanding value for the purpose in view—a constant flow of suitable plants to supply the needs of the project areas." Plants from the Orient and South African grass have proved useful as cover for the American desert and it is pointed out that "the practice of producing seed of native grasses under cultivation . . . favors good yields and purer seed."

DANIEL, H. A. (3685)

PROGRESS REPORT ON THE PRODUCTION OF ANNUAL LEGUMES IN THE PANHANDLE OF OKLAHOMA. Okla. Panhandle Agr. Expt. Sta. Bull. 59: 3-9. 1936.

"Soybeans as a whole made a very poor yield of both hay and grain and should not be recommended for the semi-arid country. However, the highest yielding hay-producing varieties were Laredo, Pinedell, and Old Dominion. Tepary beans were found to be the surest and most profitable legume hay crop for the Panhandle of Oklahoma, cowpeas second, mung beans third and soybeans fourth."

DAVIS, CHESTER. (3686)

THE GRASS REVOLUTION. Assoc. Land-Grant Col. and Univ. Ann. Cong. 49. 11 pp. (Washington, D. C.) November 19, 1935. [Mimeographed.]

"Originally, of course, ours was a land of grass and forest, a continent of fertile soil. That grass and forest receded before the plow is a natural development." The writer discusses the historic trend away from grass and the actual reversal of that trend back toward sound farming practices. "With the continued encouragement furnished by the adjustment programs as an enabling instrument in support of the teachings of the Land-Grant Colleges much can be done . . . to protect for our farmers and our consumers the fertility of the soil . . ." The A. A. A. program is reviewed.

(3687)

RISE OF GRASS. Country Gent. 106: 18, illus. January 1936.

The author says that a review of agricultural history in the United States reveals a constant surrender of grass to cultivated crops. The new agricultural adjustment contracts make it more profitable for farmers to increase the acreage that is devoted to soil building and constructive

uses; pastures in place of too much crop-growing will help to conserve and improve what is already here and will provide an assurance of continued soil fertility.

DAVIS, P. O. (3638)
LEGUMES IN ALABAMA. *South. Agr.* 66: 10. September 1936.

Success with fall-seeded Austrian winter peas and hairy vetch on Alabama soils as nitrogen-gathering crops is described by the writer. He also mentions the value of crimson clover for its reseeding habits.

DICKEY, P. B., and BLAIR, T. B. (3639)
SOME INFLUENCES OF VEGETATION IN SOIL EROSION CONTROL. *Soil Conserv. Digest* 2 (11): 4-6. August 1936. [Mimeographed.]

The authors discuss the vegetative control program of the California-Nevada region.

DILLMAN, A. C. (3690)
GRASSES FOR CANAL BANKS IN WESTERN SOUTH DAKOTA. *U. S. Bur. Plant Indus. Cir.* 115: 23-31, illus. 1913.

Describes experimental work conducted in South Dakota for determining what grass or combination of grasses will best establish a satisfactory sod in areas left bare by the construction of canals and ditches. Recommendations are made for the use of brome grass, western wheatgrass, and alfalfa.

EAGLES, L. D. (3691)
PLANTING MATERIALS USED IN SOIL CONSERVATION. *Soil Conserv.* 2: 152. January 1937.

A table shows the kinds, amounts, and principal uses of seed and other materials purchased through the nursery section of the Soil Conservation Service from July to November 1936.

EASTERDAY, A. M. (3692)
WEED TERRACES. *Soil Conserv.* 3: 45-46, illus. August 1937.

A description of the use of tumbleweeds, Sudan grass, millet, and cane on the Mansker demonstration project near Clayton, N. Mex.

EDWARDS, D. C. (3693)
REPORT ON GRASSLAND IMPROVEMENT IN KENYA, 1934. *East African Agr. Jour.* 1: 269-277, 344. January 1936.

Contains descriptions of experiments connected with high-moisture low-temperature areas, intermediate areas, and comparatively low-moisture areas, for the determination of herbage suitable for pasture conservation and intensive grazing in Kenya.

ENLOW, C. R. (3694)
PROMISING INTRODUCED SPECIES. *Amer. Soil Survey Assoc. Bull.* 17: 118-120. 1936.

Gives information concerning some of the plant introductions resulting from the distribution of seed secured from Turkestan, Turkey, and China.

REGRASSING THE SEMIARID PLAINS. *Soil Conserv.* 1: 11-13. February 1936. (3695)

Describes different grasses suitable for maintenance of protective cover in the Great Plains. The work of the Soil Conservation Service in regrassing research is reviewed.

ETHERIDGE, W. C., and HELM, C. A. (3696)
KOREAN LESPEDEZA IN ROTATIONS OF CROPS AND PASTURES. *Mo. Agr. Expt. Sta. Bull.* 360, 22 pp., illus. 1936.

"Because of its dense and well rooted growth, lespedeza is highly efficient in the control of soil erosion. It is the key crop in a series of new rotations which are highly productive in terms of annual output per acre and efficient in soil conservation . . . The rapid extension of this new crop is one of the most remarkable developments in Missouri farm history . . ."

FAIN, J. R. (3697)
LEGUMES AND MANURE IMPROVE SOIL. *South. Agr.* 66: 10. September 1936.

Notes results of studies to determine soil improvement by legume plantings in Georgia soils.

FENNER, OLEN L.

(3698)

PERMANENT MEADOW BUFFER STRIPS. Farm and Ranch 56: 7, 14, illus. August 1, 1937.

The author points out the need of supporting terraces with strips of close-growing crops and emphasizes little bluestem for this purpose. He claims that on some fields permanent meadow-buffer strips can be used instead of terraces which practice greatly reduces erosion-control costs and entirely eliminates the cost of maintenance.

FLEMING, B. P., AND WHITFIELD, C. J.

(3699)

POSSIBILITIES OF VEGETATIVE RESTORATION ON THE GILA. The Land, Today and Tomorrow 2: 15-17, illus. April 1935.

The author describes the Gila watershed in southeastern Arizona and southwestern New Mexico as "one of the most savage and melancholy spectacles of man-induced erosion in the United States . . ." and discusses the work of the Soil Erosion Service at the Gila project.

FLETCHER, F. F.

(3700)

SERICEA IN SOUTHWEST VIRGINIA. South. Planter 98: 17. February 1937.

Information on how to seed and cut *Lespedeza sericea* is given. Also what an acre of sericea will pay, and its feed value in hay.

FLORY, EVAN L.

(3701)

SILTING DID NOT DISCOURAGE THIS PLANT. Soil Conserv. 2: 193, illus. March 1937.

The hardiness and ability of sacaton (*Sporobolus wrightii*) to survive under unfavorable conditions is described.

FRENCH, A. L.

(3702)

SODS SAVE THE HILLS. Country Gent. 81: 148. January 22, 1916.

The author blames the wasteful cropping system in the South for the loss of good soil in the hill sections. "Soil conservation is by far the biggest problem before the Southern people." A successful way is "to cover the lands with sod and fill the topsoil full of close-growing grass and clover roots."

FULLER, GUY C.

(3703)

A CLOSE-UP OF BUFFALO GRASS, NATIVE OF THE GREAT PLAINS. Soil Conserv. 2: 48-49, 56-57, illus. September 1936.

The writer declares that "buffalo grass, native to the Great Plains, meets all the requirements for erosion control. Once established, it is better than any other native grass throughout the range of its adaptation . . . it is persistent and will survive under extreme conditions and rough treatment."

(3704)

MACHINERY THAT FACILITATES THE HARVESTING OF GRASS SEED. Soil Conserv. 1: 12-13, illus. December 1935.

Describes various mechanical devices for harvesting grasses of the Great Plains and similar areas.

FULTS, JESS L.

(3705)

BLUE GRAMA GRASS FOR EROSION CONTROL AND RANGE RESEEDING IN THE GREAT PLAINS AND A METHOD OF OBTAINING SEED IN LARGE LOTS. U. S. Dept. Agr. Cir. 402, 8 pp., illus. July 1936.

"There is a distinct need for more drought-resistant, palatable, strong-rooted, long-lived range and pasture grasses than are now commercially available. These are needed especially for certain over-grazed and eroding areas of the Great Plains, the Southwest, and the Rocky Mountain States . . ." Special attention is given to harvesting and threshing trials in Soil Conservation Service projects in North Platte, and O'Neill, Nebr.

GARRARD, H. L.

(3706)

REPLACE PLANT FOOD LOSSES IN CROPS. Better Crops With Plant Food 21: 12-13, 40-41. June-July 1937.

Discussion of legumes with respect to soil conservation and fertility.

GERNERT, W. B.

(3707)

NATIVE GRASS BEHAVIOR AS AFFECTED BY PERIODIC CLIPPING. Jour. Amer. Soc. Agron. 28: 447-456, illus. 1936.

Gives detailed description of a study of material supplied by a virgin-grass-clipping project carried on at the Oklahoma Agricultural Experiment Station during the past 6 years and deals with a special study of 12 of the 96 plots in comparison with an idle roadside and a pastured area.

GORDON, R. B.

(3708)

A PRELIMINARY VEGETATION MAP OF INDIANA. Amer. Midland Nat. 17: 866-877. September 1936.

Eight major types or alliances of primary plant communities are recognized. These types can be further subdivided to include 25 or more primary plant associations and at least 5 relict associations which will be met with in the field.

[HANSEN, N. E.]

(3709)

DEPOPULATE THE PRAIRIES? No! Capper's Farmer 47: 13, 54. June 1936.

Plants introduced into the prairie regions of the United States from Asiatic countries are discussed by Hansen, with special emphasis on crested wheat and chee grass from the eastern part of the Union of Soviet Socialist Republics and Siberia. Many varieties of forages, grains, legumes and fruits, introduced by him, should be tested in the interests of soil conservation.

HATCH, HENRY.

(3710)

SHOULD WE ALL "GO TO GRASS?" Kans. Farmer 74: 9. June 20, 1936.

Crop conditions in Kansas with reference to pasture increase and soil conservation are discussed. The author refers to the low annual money return to the acre from bluestem grass. He questions whether this transfer of so much land to grass "will not work us into an over-balance of grass acreage" and create a new problem in the effort to solve another.

HELM, C. A.

(3711)

BARLEY FARMING. Capper's Farmer 47: 7, 43, illus. August 1936.

"Winter barley promises to effect a new cropping practice in Missouri . . . On many farms it will replace wheat now grown mainly for its value in soil erosion control and as an agency for establishing meadows in regular crop rotation. It is superior to wheat as a fall pasture, as a nurse crop for clover and grass, and equal to wheat as a cover crop . . . Barley sown early after the removal of soybeans for hay is a better soil erosion control crop than wheat, which on account of danger from Hessian fly infestation, cannot safely be planted until later. Thus the soybean (hay)-barley succession will remove the general objection that unrestricted production of soybeans leads to severe soil erosion."

HENDRICKSON, B. H.

(3712)

CROP ADAPTABILITY FOR EROSION CONTROL UNDER SOUTHERN CONDITIONS. U. S. Soil Conserv. Serv. SCS-TP-10, 6 pp. May 1, 1936. [Mimeographed.]

"This short discussion centers around the use of erosion resistant crops on erodible croplands in the South. These eroding croplands are the 'sore spot' in the soil conservation problem . . ." Characteristics of resistant crops are discussed in detail. The article is the result of soil-erosion studies conducted at the agricultural experiment station at Tyler, Tex.

HENDRY, G. W.

(3713)

SOURCE LITERATURE OF EARLY PLANT INTRODUCTION INTO SPANISH AMERICA. Agr. Hist. 8: 64-71. April 1934.

An attempt is made to assemble for the first time some of the scattered references to early plant introduction in the United States. "In the following lists the names of some 147 species and varieties of alien cultivated plants . . . have been arranged into five groups: field crops, fruit and nut crops, truck crops, herb and medicinal crops, and ornamental plants."

HENKEL, J. S.

(3714)

THE RELATION OF VEGETATION TO WATER SUPPLY IN SOUTHERN RHODESIA. So. African Jour. Sci. 25: 38-51. December 1928.

The author endeavors to describe the vegetative covering and how it is affected by water supply over 150,000 square miles. Some of the results

noted are of practical importance to South Africa. It has been shown that, with rest from human interference, the primal conditions tend to become restored. Evergreen trees are listed as well as other drought- and fire-resistant trees. The distribution of vegetation is summarized in a table.

HILL, R. (3715)

A SPLENDID SAND-BINDING GRASS. So. Aust. Dept. Agr. Jour. 32: 512-513, illus. January 15, 1929.

A brief description of *Ehrharta villosa* variety *maxima* (South African pyp grass), and its value as a soil binder. One year's growth of an underground runner is sometimes 14 feet.

HITCHCOCK, A. S. (3716)

THE GENERA OF GRASSES OF THE UNITED STATES, WITH SPECIAL REFERENCE TO THE ECONOMIC SPECIES. U. S. Dept. Agr. Bull. 772, 302 pp., illus. 1936.

A revision by Agnes Chase of the bulletin first issued in March 1920. "The present bulletin describes all the genera of grasses that include species that are native, have been introduced, or are cultivated in the United States. It is intended to give under each genus the botanical information concerning all our grasses that are conspicuous enough to have attracted the attention of agriculturists."

(3717)

MANUAL OF THE GRASSES OF THE UNITED STATES. U. S. Dept. Agr. Misc. Pub. 200, 1,040 pp., illus. 1935.

(3718)

MANUAL OF GRASSES OF THE WEST INDIES. U. S. Dept. Agr. Misc. Pub. 243, 439 pp., illus. 1936.

HOLSINGER, S. J. (3719)

THE MESQUITE: A DESERT STUDY. Forestry and Irrig. 8 (11): 447-453, illus. 1902.

A description of the habits and uses of a valuable tree of the Southwest is given. "The Supreme Court of the Territory in 1896 decided that this hardy pioneer of the desert [the mesquite] was not 'timber', in the meaning of the United States Statutes, and was not entitled to the protection afforded by the public timber laws." The author cites controversies waged over this "persistent representative of the vegetable kingdom; but the Mesquite has continued to flourish despite drouth, failure of appropriation for irrigation, and in the face of adverse judicial decisions."

HOOD, GEORGE W. (3720)

GREEN ROADSIDES MAKE STABLE HIGHWAYS. Soil Conserv. 2: 26-27, illus. August 1936.

The author tells how to use vegetation in highway maintenance.

HOPKINS, C. B., AND READHIMER, J. E. (3721)

SOIL IMPROVEMENT FOR THE WORN HILL LANDS OF ILLINOIS. Ill. Agr. Expt. Sta. Bull., 115, pp. 431-443, illus. April 1907.

Reclamation measures for acid lands "so sour that legume crops, especially clover and alfalfa, cannot be grown successfully", are summarized. The authors advocate ground limestone for soil deficiency. "... if they would grow well, marked improvement could be made by clover-alfalfa, cowpeas, or other legumes, provided the crop or the manure made from it is plowed under."

HORTON, S. A. (3722)

DEEP GRASS. Capper's Farmer 47: 13, illus. September 1936.

The value of Sudan grass, native bluegrass, and a seeded mixture of sweetclover, alsike and medium red clover, and timothy, for rich pasture for hogs and cattle, as used in rotation on a farm in Nicollet County, Minn., is discussed and illustrated.

HOWARD, I. M. (3723)

CHANGES ON THE OLD CHISHOLM TRAIL. Amer. Cattle Prod. 18: 3-5, illus. June 1936.

Describes experiments with native grasses for reclamation of territory bordering the Chisholm Trail in Texas, Oklahoma, and Kansas, carried out

at regional soil conservation nurseries at Stillwater, Okla. Grasses used in experiments are little bluestem, big bluestem, side-oats grama, western wheat grass, Indian, blue grama, buffalo, and switchgrass; experiments show that mixtures of big and little bluestem, blue grama, and western wheatgrass prove most successful in control of erosion and conservation of moisture.

HOWARD, J. M. (3724)
GRASS SAVES AND PAYS. *Capper's Farmer* 47: 27, 65. April 1936.

At the soil conservation nurseries located near Stillwater, Okla., more than 250 species of native grasses and 50 introduced grasses have been studied. Among the best native grasses studied are the blue-stems, blue grama, buffalo, switchgrass, Indian, western wheatgrass, and side-oats grama.

REJUVENATION BY REVEGETATION. (3725)
Farm and Ranch 55: 4, 16, illus. September 15, 1936.

Erosion-control demonstrations on various Soil Conservation Service projects are reviewed with reference to strip cropping, particularly. Mention is made of the method used at the Duck Creek project at Lindale, Tex., called "base-line stripping." Suitable grasses for pasture ridges and gully control are suggested.

HUNTER, E. W. (3276)
PLAINS COUNTRY CLOVER. *Capper's Farmer* 47: 11, 38, illus. April 1936.

"Sweet clover fills the vital need for a pasture crop between the time cattle are removed from wheat fields and before native grass has renewed growth. Its drouth resistance . . . its value as a pasture and hay crop . . . the effect it has on soil through addition of organic matter and improved tilth, the cover it affords—all are multiplied in greater or less degree under Plains conditions . . . Specific procedure with reasonable assurance of high percentage of success has resulted from the experimentation at Hays, Kans."

IMPERIAL BUREAU OF PLANT GENETICS. (3727)
THE VEGETATION FACTOR IN EROSION CONTROL. *Imp. Bur. Plant Genetics*
Herbage Rev. 4: 13-23. March-June 1936.

This is a general review of investigations and research into the character of soil erosion and methods of control as set up by the Soil Conservation Service, with special emphasis on the vegetation factor as exemplified by the crops and pastures grown on eroded lands in the United States. Treats the following phases of the subject in some detail: Comparative losses from erosion, organic matter, strip cropping, gully control, crop rotations, pastures and grasslands, semiarid plains, indigenous grass species, and introduced plant species.

INTERNATIONAL CONGRESS OF BOTANY. (3728)
PROCEEDINGS . . . SEPTEMBER 2-7, 1935. 2 v. Leiden. 1935.

The following papers were among those read at this Congress: Interactions Between Roots and Soils; Interactions Between Plants, by E. J. Russell, volume 2, pages 1-3; The Biotic Factor and the Instability of Grassland Associations, by R. G. Stapledon, volume 2, pages 8-10; The Weed Flora in Its Relation to Crop and Agricultural Treatment, volume 2, pages 5-7.

JACKMAN, E. R., STEPHENS, D. E., AND RICHARDS, D. E. (3729)
CRESTED WHEAT GRASS IN EASTERN OREGON. *Oreg. Agr. Col. Ext. Bull.* 494, 38 pp., illus. 1936.

Detailed information on methods of planting and harvesting. Uses include pasture on former grain and range lands, rotation crop with wheat, hay crops on dry or partly irrigated land, erosion control, planting on burned-over forest land.

JARDINE, J. T. (3730)
BACK TO GRASS AND FORAGE. *U. S. Ext. Serv. Rev.* 5: 49-50. April 1934.

The author discusses the importance of less intensive land-use practice and stresses the value of wider utilization for pasture, meadows, and forests.

JARNAGIN, M. P.

(3731)

CONSERVING SOIL WITH GRASS. Atlanta and West Point Railroad Co. Agr. Bull., pp. 1-3, 25, illus. Spring 1937.

"Since man has been cultivating the soil, plant-food has been washed out twenty-one times faster than the plants have used it in the production of crops. Grass is the surest means of protecting land under cultivation from erosion. Aside from economy, grass is a natural food for all classes of farm animals." A table shows the pounds of soil lost per acre by erosion on a Georgia University farm from 1933 to 1936.

KABANOV, N. E.

(3732)

BIBLIOGRAFICHESKAÏA AVODKA MATERIALOV PO RASTITEL'NOMU I POCHVENNOMU POKRUBU DAL'NEVOSTOVNOGO KRAÏA ZA POSLEDNEE DESÏATILETIE (1923-1933). Trudy Dal'nevost Filiala Akad. Nauk SSSR Ser. Bot. 1: 433-568. 1935. [In Russian.]

Bibliography on the vegetation and soil cover of the Soviet Far East for the last decade.

Not examined.

KRAEBEL, C. J., AND PILLSBURY, A. F.

(3733)

USE OF VEGETATION FOR EROSION CONTROL IN MOUNTAIN MEADOWS. Calif. Forest Expt. Sta. Tech. Note 2, 13 pp., illus. 1933.

Willow planting is regarded as one of the quickest and surest ways of securing vegetative protection. Specific directions for planting willows in mountain meadows are given.

KRAMER, J., AND WEAVER, J. E.

(3734)

RELATIVE EFFICIENCY OF ROOTS AND TOPS OF PLANTS IN PROTECTING THE SOIL FROM EROSION. Nebr. Univ. Conserv. and Survey Div. Bull. 8, 93 pp., illus. 1936.

Results of studies on the rate of erosion of soil protected by roots and tops as compared with similar soil free from living plants are discussed. Experiments with field, pasture, garden crops, weeds, buckbrush, and native grasses are described.

KRIEGHBAUM, HILLIER.

(3735)

A LID FOR THE DUST BOWL. Today 6: 14, 21, illus. May 2, 1936.

Discusses values of various grasses, as buffalo grass, *Aristida Pennata*, wild alfalfa, western wheatgrass, big bluestem, little bluestem and blue grama, in reclamation of dust bowl soils, with special reference to difficulties of seed collection and efforts of Soil Conservation Service workers to collect large amounts of seed for planting.

LAIDLAW, A. F.

(3736)

ONE STREAM AND TWO FARMS. Soil Conserv. 1: 10. October 1935.

On the value of soil-holding vegetation on a farm near Winona, Minn.

LAMSON-SCHIBNER, F.

(3737)

GRASSES AS SAND AND SOIL BINDERS. U. S. Dept. Agr. Yearbook 1894: 421-436, illus. 1895.

Recommends and discusses several species of grass for binding sand and soil. It embraces two classes—the sand binders of the seashore and inland sand binders. The adaptability of each grass to a stated locality is given considerable attention.

(3738)

SAND-BINDING GRASSES. U. S. Dept. Agr. Yearbook 1898: 405-420, illus. 1899.

"The purpose of this paper . . . is not to deal with the final holdings of the sands by forest trees or other means used in the work of sand binding, but to call attention to the various grasses which have been used for fixing shifting sands and which may be classed as sand binders." The particular region to which each grass is best suited is given. The article deals with grass species under two classes, e. g., those most adaptable to coastal regions, and those best fitted for inland conditions.

LARSEN, J. A.

(3739)

NATURAL REVEGETATION ON ERODED SOILS IN SOUTHEASTERN OHIO. Iowa State Col. Jour. Sci. 9: 365-377, illus. 1935.

"The purpose in this paper is to set forth certain changes which are taking place in the vegetative cover on severely eroded and abandoned farm land in southeastern Ohio. This land had been used for livestock, farming . . . and passed out of cultivation twenty-five years ago." The present vegetative communities on this farm are shown in a map and tables. The forest and forest borders are described, and the root habit of various plants and trees are shown in graphs. In his summary the writer states: "Where cultivation and grazing have been discontinued the natural vegetation reclaims the depleted areas at a very encouraging rate, tending to rebuild the eroding soil."

LISTER, P. B., and SCHUMACHER, F. X.

(3740)

INFLUENCE OF RAINFALL UPON TUFT AREA AND HEIGHT GROWTH OF THREE SEMI-DESERT RANGE GRASSES IN SOUTHERN ARIZONA. Jour. Agr. Research 54: 109-121. January 15, 1937.

"It is the purpose of this paper to report the method and results of an investigation into the responses of three important forage grasses to variations in the amount and distribution of seasonal moisture supply on areas from which grazing animals had been excluded. These areas are on the Santa Rita experimental range of the Southwestern Forest and Range Experiment Station in southern Arizona."

LOWDERMILK, W. C.

(3741)

CERTAIN ASPECTS OF THE ROLE OF VEGETATION IN EROSION CONTROL. Iowa State Col. Jour. Sci. 9: 337-346. 1935.

"The nature of interrelations between vegetation and soil erosion has been disclosed by experimental studies, which have been in progress for nearly two decades." Results of experiments at various experimental stations between erosion and run-off from the natural forest plots and the cultivated plots are compared. Graphs indicating the effect of various types of crops, crop rotations, and plowing in of cover crops are given. "Until American agriculture can afford to level terrace its sloping lands, as did the Incas, certain limitations and rededication to use seem to be necessary, if soil wastage is to be curtailed and water conservation is to be effected."

(3742)

ROLE OF VEGETATION IN EROSION CONTROL AND WATER CONSERVATION. Jour. Forestry 32: 529-536. May 1934.

The author contends that data on forest influences and land management should be thoroughly established in the interests of permanent advancement in erosion control and that much controversial literature indicates incompleteness of scientifically established knowledge in this field. He reviews the status of information on certain phases indicating to what point investigations have been made and need to be made to bring scientific data up to date.

McCOWN, CRAYTON.

(3743)

HONEYSUCKLE FOR EROSION CONTROL. S. C. Soil Conserv. News. 1 (3): 14. January-February 1936.

McELROY, J. J.

(3744)

PRAISE FOR CRESTED WHEAT GRASS. Agr. Leaders' Digest 18: 18. January 1937.

Crested wheatgrass has proved to be a good drought-resisting grass in Campbell County, Wyo.

MCGINNIS, B. W.

(3745)

UTILIZATION OF CROP RESIDUES TO REDUCE WIND EROSION. The Land, Today and Tomorrow 2: 12-14, illus. April 1935.

An account of the work of the soil-erosion control project at Dalhart, Tex. The author recommends the maintenance of sufficient vegetation to check wind erosion and discusses the comparative merits of different crops.

- MACPHERSON, A. (3746)
 RECLAMATION OF SAND AREAS. Jour. New Zeal. Dept. Agr. 5: 364-370, illus. 1912.
 "This article discusses the value and use of several leguminous plants, including alfalfa, as soil binders in the reclamation of sandy lands in New Zealand and presents a report on the experimental plantings of alfalfa for this purpose."—Expt. Sta. Rec. 28: 230. 1913.
- McPHERSON, D. L. (3747)
 A GREAT NITROGEN SOIL BUILDER. Rice News 3: 6. August 1936.
 As a nitrogen producer, *Crotalaria spectabilis* is superior to the cowpea or soybean. It is most beneficial to alluvial and sandy soils. First introduced by the United States Bureau of Plant Industry from Africa in 1918 and sent to the Florida Experiment Station.
- MADDOX, R. S. (3748)
 PROGRESS IN RECLAIMING WASTE LANDS IN WEST TENNESSEE. Resources of Tenn. 6: 217-224, illus. October 1916.
 The author investigated west Tennessee wastelands and tells of his experiences. The efforts of local farmers in combating erosion and gullying are described. Black locust, Bermuda grass, honeysuckle, and walnut trees were especially favored for ground cover. The author also observes that data on the effectiveness of Kudzu and Himalaya vines were not available as they were still in the experimental stage.
- MAGYAR, PAUL. (3749)
 THE PHYTO-SOCIOLOGICAL BASES FOR THE FORESTATION OF SANDY AREAS. Erdészeti Kísérletek 35 (3): 199-227. 1933. [In Magyar mimeographed translation in U. S. Forest Serv., Div. Silvics, Transl. 158, 23 pp. 1934.]
 The author discusses plant communities of importance from the standpoint of plant ecology and silviculture. Data are chosen which represent, as much as possible, the rolling, treeless sand expanses, as well as the higher dune types. "We have, therefore, studied all variations in topography of the dunes, basing our inquiries on the poorest, friable, light yellow or gray sand hills, passing from these to the firmer dark-colored soils rich in nutrients."
- MASON, A. J. (3750)
 IS OUR CORN SOIL DOOMED? Farm Jour. 51: 34, 40. March 1927.
 The author discusses physiographic elements which influence soil conditions. "Not forests, but well-grassed sod surfaces are the real creators and preservers of our vegetable mould." He explains the part angleworms take in the formation of vegetable mould.
- METZGER, J. E. (3751)
 WINTER BARLEY. South. Planter 97: 4, 13. September 1936.
 The importance of new bearded but barbless winter barley bred at the Maryland Agricultural Experiment Station, not only for crop rotation but also for feeding purposes, is pointed out.
- MILLER, E. C. (3752)
 THE ROOT SYSTEMS OF AGRICULTURAL PLANTS. Jour. Amer. Soc. Agron. 8: 129-154. May-June 1916.
 This paper reviews the extent of root systems, including methods for their isolation; the relation of the weight of roots to the aerial portion of the plant; and the influence of moisture, fertilizers, and oxygen on root growth and development.
 Literature cited, pages 150-154.
- MILLER, E. E. (3753)
 GRASS ON THE SOUTHEASTERN HILLS. Country Gent. 81: 740. April 1 1916.
 "The whole southeastern cotton country must have a great many pasture fields before soil waste is stopped and soil enrichment is really begun." Examples of quick and economical methods for putting cotton land into grass are given.

- MILLER, H. A. (3754)
FARM PRACTICE WITH LESPEDEZA. U. S. Dept. Agr. Farmers' Bull. 1724, 17 pp. 1934.

"It would be difficult to estimate the value of the common lespedeza, . . . as a soil-holding plant. In a number of instances, Korean seeded on badly eroded hillside pastures has completely stopped soil washing in 2 to 3 years." Considerable data are given on planting and cropping systems.

- MORAN, C. (3755)
WIND DEFYING GRASSES. U. S. GOVERNMENT SCOUTS SEARCH WORLD FOR PLANTS THAT HAVE CONQUERED AN UNFAVORABLE ENVIRONMENT AND FIND VARIETIES THAT PROMISE SUBSTANTIAL AID TO PRAIRIE STATES FARMERS. Capper's Farmer 47: 18, 79, illus. March 1936.

Describes exotic plants from many countries, with notes on experimental plantings in the Plains. "In Turkey, plant explorers found a desert grass that may be uprooted by the wind but which grabs hold again when it lands . . . the Government has imported from the Orient nearly 4,000 distinct strains of soybeans . . ." The saltbush of Central Australia, valued for its drought-resisting qualities, is described.

- MUSGRAVE, M. E. (3756)
CURING THE SICK LAND. Farm and Ranch 54: 1, 3, illus. November 1, 1935.

" . . . there are in the United States at present millions of acres of sick land—land, which because of one or a dozen reasons, is no longer able to function properly, to produce a healthy vegetative crop. This vegetation may be farm crops, or it may be the natural plant growth suitable for range lands, such as grass or palatable browse plants for grazing animals. The latter type of land with a discussion of its illnesses and what we believe to be some cures, forms the subject of this article."

- NEEL, L. R. (3757)
MAKING MONEY WHILE SOLVING EROSION PROBLEM. South. Agr. 67: 12, illus. March 1937.

Through the orderly use of land, J. T. Laten, a farmer of Lincoln County, Tenn., is "handling the ever-troublesome erosion problem and is producing a number of crops to put on the market all through the year." The article stresses the value of lespedeza.

- NORMANN, O. K. (3758)
WEED CONTROL AND ERADICATION ON ROADSIDES; A STUDY OF PRESENT PRACTICES AND THEIR PRACTICAL APPLICATION. Pub. Roads 17: 281-300, illus. February 1937.

"Recent studies by the United States Department of Agriculture have shown that for each climatic or soil condition there is a type of desirable vegetation that requires little or no encouragement to grow and that will prevent soil erosion equally as well as undesirable varieties do. The pioneering annual or early ruderal types of vegetation are usually most valuable as temporary forerunners of more permanent plants that are desirable as ground-cover protection. Weeds give way to more desirable vegetation on roadsides where proper maintenance methods are practiced."

Bibliography, pages 299-300.

- OLIVER, FRANCIS W., AND SALISBURY, E. J. (3759)
VEGETATION AND MOBILE GROUND AS ILLUSTRATED BY *SUAEDA FRUTICOSA* ON SHINGLE. Jour. Ecology 1: 249-272, illus. 1913.

"We propose in the present article to consider in some detail the circumstances of establishment and maintenance of a vegetation on an intermittently active beach—employing *suaeda fruticosa* as our type—and, further, to consider the effect of the presence of plants upon the landward movement of the shingle. Finally, in the light of our observations, an attempt is made to deduce the probable results that may be expected to follow the systematic planting or afforestation of mobile beaches."

- OSBORN, BEN, AND WHITAKER, H. L. (3760)
SIGNIFICANCE OF NATURAL VEGETATION IN PLANNING EROSION CONTROL AND WILDLIFE MANAGEMENT. Soil Conserv. 2: 126-129, illus. December 1936.

Calls attention to possible correlation between natural plant communities and the degree of erosion, both before and after disturbance. "W. E.

Booth found that in Cleveland county, Okla., the greatest degree of erosion had occurred in the Oak-Hickory and Oak-Bluestem communities; while the least erosion was found in Bluestem-Drop seed."

PAMMELL, L. H. (3761)

I. QUACK AND WHEAT GRASSES. II. SOME SOIL BINDING GRASSES. Iowa Agr. Expt. Sta. Bull. 83, pp. 397-421, illus. 1905.

"Quack grass has been recommended as a soil binder for railroad embankments. As to the matter of protecting gullies or washouts in fields, there is no better grass than quack grass." Western wheatgrass and sandgrass are recommended to control sand dunes.

PECHANEC, J. F. (3762)

THE IDENTIFICATION OF GRASSES ON THE UPPER SNAKE RIVER PLAINS BY THEIR VEGETATIVE CHARACTERS. Ecology 17: 479-490, illus. July 1936.

"It is the purpose of this paper to present a usable key to some important range grasses of the West based on vegetative characters."

PENNSYLVANIA DEPARTMENT OF FORESTS AND WATERS. (3763)

NEW DEVELOPMENTS IN NURSERY PRACTICE AND TREE PLANTING. Pa. Dept. of Forests and Waters, Serv. Letter 7: 2-3. March 19, 1936.

Description is given of methods of machine seeding, root pruning, growing seedlings without the use of shade, use of aluminum sulphate for controlling damping-off, and of pruning black locust seedlings while still in the seedbed. The author explains the use of chaff in establishing seed spots and believes this method of seeding offers considerable promise for interplanting and erosion-control work.

PIETERS, A. J. (3764)

GIVE LESPEDEZA HALF A CHANCE—AND IT WILL CHECK EROSION, PROVIDE HAY AND GRAZING, AND DOUBLE CROP YIELDS. Prog. Farmer (Car.-Va. Ed.) 52: 10, illus. February 1937.

"Lespedeza is a lifesaver for a land in need . . . This is not an article on erosion, but we can't overlook the fact that . . . landowners will have to realize the fact that land turned out and lying bare is washing away just as much as land in corn or cotton . . ."

PIPER, C. V. (3765)

IMPORTANT CULTIVATED GRASSES. U. S. Dept. Agr. Farmers' Bull. 1254, 38 pp., illus. 1922.

"This . . . bulletin is designed to enable farmers and others to become familiar with the most important and most common grasses of the United States. Each grass is illustrated and agronomic and botanical information concerning it is given . . ."

POTTS, G. (3766)

THE PLANT SUCCESSION IN THE ORANGE FREE STATE AND THE NEED FOR MAINTAINING A COVERING OF VEGETATION. So. African Jour. Sci. 20: 190-201. October 1923.

"A tall, close *Anthistiria*-grass veld, such as is still today, despite a somewhat reduced rainfall, the natural climax vegetation over large areas of the Free State, exhibits few of the troubles we associate with drought. The bulk of the rain is held by the dense mat of grass and gradually absorbed by the soil . . ." The effect on *Anthistiria*-veld of burning, heavy grazing, and severe drought is described. These have the effect of "putting back the succession". Erosion on thin, open country and in the eastern part of the Free State, and the responsibility of man are discussed. An experiment on the effect of trees and other vegetation on soil erosion and associated evils is outlined.

PROEST, A. H. (3767)

PLACING ANNUAL LEGUMES IN CORN BELT ROTATIONS. Purdue Agr. 31: 5, 13, illus. October 1936.

Recommends and discusses the value of soybeans, cowpeas, lespedeza, crimson clover, and Hubam clover for catch crops, emergency crops, crops used to displace a nonlegume crop in some standard rotation, and crops used to displace a legume of another sort in the rotation.

- RALSTON, W. R. (3768)
 AGRICULTURAL CONSERVATION IN CALIFORNIA. Calif. Cult. 84: 339, 362-363.
 May 8, 1937.

Improvements are pointed out in the 1937 program in the recognition of two general types of farming—diversion and nondiversion, and the greater emphasis placed on soil-building practices. Crop classifications under the 1937 program are soil-depleting, soil-conserving, and neutral crops. "Soil-depleting crops are generally those which lower soil fertility. Soil-conserving crops are those which do not necessarily add plant food to the soil, but tend to hold the soil in place . . ." Neutral crops are listed as perennials, such as orchards, vineyards, idle cropland, and nursery stock.

- ROBERTS, GEORGE. (3769)
 LEGUMES IN CROPPING SYSTEMS. Ky. Agr. Expt. Sta. Bull. 374, 153 pp. 1937.

Discusses the problem of the fixation, utilization, and conservation of a sufficient supply of nitrogen in the soil and shows why such a supply is necessary to the maintenance of a vigorous ground cover to prevent soil erosion.

- ROBERTS, H. F. (3770)
 SAND BINDING GRASSES. Kans. Agr. Expt. Sta. Bull. 121: 139-141. 1904.

"A grass, to be a 'sand-binder', must be, first, a perennial, and must have the habit either of sending out creeping stems below the ground, from which the aerial shoots come up, or of sending out runners above the surface of the ground, or both." Marram, or beach grass, Canada bluegrass, hard, red, sheep's fescue, slender fescue, and lime grass are described. "In connection with the grasses, it is desirable, as soon as possible, to start legume plants of species which will endure hard conditions."

- ROBINSON, D. H. (3771)
 LEGUMINOUS FORAGE PLANTS. 119 pp., illus. London, Edward Arnold & Co. 1937.

"The chief object of this little book is to enable interested persons to recognize the more important leguminous plants grown on the farm, both in the seedling and in the mature stage." Every species described is illustrated. Glossary of scientific terms, pages 115-116.

- ROCKIE, W. A., AND JOHNSON, A. J. (3772)
 VEGETATIVE CONTROL OF EROSION. Wash. Agr. Expt. Sta. Bull. 291: 59-60. 1934.

This contribution gives the results of studies in erosion control conducted at the agricultural experiment station at Pullman, Wash.

- ROPER, I. M. (3773)
 SPARTINA AND COAST EROSION. Roy. Bot. Gard. Kew, Bull. Misc. Inform. 1: 26-31, illus. 1918.

"The author describes experimental work with *S. townsendi* in North Somerset (England) in an effort to establish the grass on the extensive mud flats of the River Severn as a means of protection against erosion from the high spring tides and winter storms. The plant is said to give considerable promise for the future."—Expt. Sta. Rec. 40: 530. 1919.

- ROWALT, E. M. (3774)
 KUDZU IS THE FARMER'S FRIEND. Soil Conserv. 1: 12-14, illus. March 1936.
 Report of John Woody, Camp Hill, Ala., colored farmer.

- RUTTER, J. E. (3775)
 CONTROL OF SOIL EROSION IN YOUNG ORCHARDS. Amer. Fruit Grower 52: 4, 13, illus. July 1932.

Advocates "a sod mulch system, including manure and nitrogenous fertilizer . . ." for the control of erosion in uncultivated orchards. Discusses the merits of hairy vetch, rye, cowpeas, and soybeans in cultivated orchards.

- SAMPSON, A. W. (3776)
 NATIVE AMERICAN FORAGE PLANTS. 435 pp., illus. New York, John Wiley & Sons. 1924.

"The present work represents the first attempt to treat in a single volume the more important native forage plants embraced in the natural pasture

types of this country . . . It is designed for the use of the stockman-farmer and for students of general agriculture, forestry, and applied botany, but primarily for those who wish to pursue grazing work as a specialty . . . Among the most valuable features of the book are its numerous lifelike illustrations depicting the characteristics of the different forage species, nearly all of these illustrations being original." Chapter III, Environment of Range and Pasture Plants and Forces That Influence Them (Applied Plant Ecology)."

SAVAGE, D. A.

(3777)

DROUGHT SURVIVAL OF NATIVE GRASS SPECIES IN THE CENTRAL AND SOUTHERN GREAT PLAINS, 1935. U. S. Dept. Agr. Tech. Bull. 549, 54 pp., illus. 1937.

"In the central and southern Great Plains hardy native grasses, particularly Buffalo grass and blue grama are the best adapted species for controlling wind and water erosion and renewing the pasture value of formerly cultivated land." A résumé of data from all locations is given in tabular form showing species of native grasses identified during regional surveys.

(3778)

METHODS OF REESTABLISHING BUFFALO GRASS ON CULTIVATED LAND IN THE GREAT PLAINS. U. S. Dept. Agr. Cir. 328, 20 pp., illus. 1934.

The author cites the advantages of buffalo grass in controlling run-off and erosion on terraced and unterraced slopes because of its root-spreading tendencies on eroded land as well as in fertile soil. "Native buffalo grass is the only grass adapted to the Great Plains area that may be used successfully for pastures, athletic fields, golf courses, lawns, and general landscaping purposes."

SEAMAN, G. L.

(3779)

FARM YOUR LAND TO KEEP IT. THAT'S THE MOTTO OF THE HOFFMANS, IN WHOSE FAMILY THIS FERTILE FARM HAS BEEN SINCE 1740. N. J. Farm and Garden 8: 5, illus. May 1937.

Soil erosion has been conquered by placing a layer of sod in the first marks of gullies, thereby providing a "catch" for the valuable soil that starts washing away. As the sod becomes covered, the grass grows through and forms a second barrier to the run-away soil. One or two seasons of this simple, yet effective practice completely fills the ditch.

SHANTZ, H. L.

(3780)

CHALLENGE OF EROSION TO BOTANISTS. Iowa State Col. Jour. Sci. 9: 353-363. 1935.

"Erosion starts as a result of destruction of the plant cover." The writer outlines six projects to be undertaken in the work of correcting erosion damage in Arizona and stresses the need for qualified and trained botanists in this work. He considers a number of cases presenting widely varying conditions, among them the Sahara, French Somaliland, Porto Libertad (Sonora, Mexico), Cape Verde Islands, the Growler Valley of Arizona, the Mohave Reservation in Arizona, Coachella Valley, Calif., the sagebrush deserts of Utah, the San Simon Valley of Arizona, spruce fir lands, tropical rain forest, temperate rain forest, oak forests of Maryland, and cut-over pine lands of Michigan.

(3781)

THE NATURAL VEGETATION OF THE GREAT PLAINS REGION. Ann. Assoc. Amer. Geogr. 13: 81-107, illus. June 1923.

A description of the native plains vegetation as related to climate. The region considered lies between the Rocky Mountains on the west and the ninety-seventh degree of west longitude on the east. On the north it extends to the Canadian boundary and on the south to near the Mexican boundary. Plant communities are arranged according to their value to the land.

SHIMEK, B.

(3782)

THE IMPORTANCE OF OUTDOOR PLANT STUDIES. Iowa State Col. Jour. Sci. 9: 325-327. 1935.

"The need of a constant and sufficient . . . supply of water for crop plants, and the manifest influence of plants themselves on this supply through their effect on surface currents of air, have led to various attempts to regulate this moisture supply; and the mechanical effect of surface waters

on erosion and during floods, has invited various measures for their control." The importance of the plant ecologist in all problems involving water supply, drainage, irrigation, and erosion is stressed.

- SHREVE, FORREST. (3783)
MEASUREMENTS OF EROSION AND DEPOSITION AS RELATED TO VEGETATION. Carnegie Inst. Wash. Yearbook 21: 65. 1922.

"Biennial measurements were made for two years to secure evidence through bench marks as to the magnitude and chronology of the vegetational changes."—Expt. Sta. Rec. 53: 823. 1925.

- SINCLAIR, J. D., and SAMPSON, A. W. (3784)
ESTABLISHMENT AND SUCCESSION OF VEGETATION ON DIFFERENT SOIL HORIZONS. Hilgardia 5: 155-174, illus. January 1931.

"This investigation was initiated for the purpose of studying the behavior of seral activities upon areas where the soil profile had been disturbed in varying degrees." The procedure and results obtained are discussed with the aid of tables. The results are divided into (1) rate of growth, (2) extent of plant development, (3) time of seed maturity, (4) water requirements, and (5) the effect of naturally and artificially packed soils.

- SPENCE, L. E. (3785)
ROOT STUDIES OF IMPORTANT RANGE PLANTS OF THE BOISE RIVER WATERSHED. Jour. Forestry 35: 747-754, illus. August 1937.

An intensive study of the range-erosion problem, under the direction of the Intermountain Forest and Range Experiment Station "reveals the fact that the erosion is largely the result of the replacement of fibrous-rooted plants by those having taproots and semitaproots, and that it can be controlled effectively by reestablishing the original grass species or similar fibrous-rooted plants."

- STANFORD, J. E. (3786)
DELTA FARMERS ARE MAKING GOOD SOIL BETTER. South. Agr. 66: 23, illus. December 1936.

The soil-building program in Coahoma County, Miss., is discussed. The Mamloxi soybean is considered a valuable legume.

- HE DESERVES A MONUMENT. South. Agr. 66: 6, illus. August 1936. (3787)

Describes unusual success in growing crop of crimson clover by Ewing Redding on his farm in Montgomery County, Tenn. The crimson clover seeds are planted unhusked, the crops are used for pasturage, harvest, and for enriching the soil of tobacco and cornland. The article states that a crimson clover crop is invaluable for protecting the soil from erosion.

- STAPLES, R. R. (3788)
VEGETATION TYPES AND WATER SUPPLIES. East African Agr. Jour. 1: 453-455. May 1936.

Discusses forest cover, deciduous scrub type of vegetation, and grass cover with reference to efficiency in conservation of moisture in the soils of east Africa. Some tentative conclusions derived from investigations are given. "It is well to emphasize the apparent dangers of destroying both soil and water supplies by encouraging accelerated run-off through overstocking or faulty cultivation."

- STEPHENSON, R. E. (3789)
PASTURES FOR SOIL CONSERVATION. Rural New-Yorker 95: 463. May 16, 1936.

That grass is a preserver of soil fertility is the opinion of the author, who states that "nowhere else except in the forest is soil structure so perfectly developed as under a good sod. The dead and rotting roots and the humus which they supply are food for myriad soil organisms."

- TABOR, PAUL. (3790)
LEGIONS OF LESPEDEZA. Soil Conserv. 1: 6-7, illus. September 1935.

Describes various types of lespedeza and methods of propagation in the southeastern United States. "Uncounted billions of these plants are now serving as privates in the battle against soil erosion on both agricultural and waste land." Observations were made on the Sandy Creek project, Athens, Ga.

TENNESSEE AGRICULTURAL EXPERIMENT STATION. (3791)

EROSION CONTROL INVESTIGATIONS BY THE TENNESSEE STATION. Tenn. Agr. Expt. Sta. Ann. Rept. 6, 56 pp. 1933.

"Soil erosion is of the most serious import throughout the Tennessee Valley. The most damaging erosion is that which takes place on land in row crops, such as corn, cotton, and tobacco." Experiments in erosion control are recommended, with emphasis on grasses and legumes and the development of a successful pasture type of farming.

TERMAN, G. L. (3792)

LEGUMES ARE IMPORTANT IN THE KANSAS FARMING SYSTEM. Kans. Agr. Student 16: 76-78, illus. March 1937.

Includes map indicating, by counties, the percentage of crop acres devoted to the production of legumes. Legumes are listed with instructions for planting.

TREAT, E. N. (3793)

BLACKBERRIES STOPPED EROSION—AND BROUGHT A SMALL PROFIT. Amer. Fruit Grower 49 (4): 11, illus. April 1929.

An American farmer checks the ravages of soil erosion on his hillside by planting blackberries and raspberries.

UHLAND, R. E. (3794)

THE EFFECT OF PLANT COVER ON SOIL AND WATER LOSSES. Iowa State Col. Jour. Sci. 9: 329-336, illus. 1935.

"The removal of the natural cover of vegetation, which for Iowa and Missouri was chiefly prairie grasses, and the disruption of the normal porosity of the soil with plows and domestic animals caused accelerated run-off of rainwater and consequent erosion." The soil erosion stations, established in cooperation with the experiment stations of the States in which they are located, and their work are described.

UNITED STATES AGRICULTURAL ADJUSTMENT ADMINISTRATION. (3795)

EFFECT OF WINTER SOIL-CONSERVING CROPS. A COMPILATION OF EXPERIMENTAL WORK ON WINTER SOIL-CONSERVING CROPS IN THE SOUTHERN REGION AND NEARBY STATES. Agr. Conserv. South. Region 2, 54 pp. September 1936.

"In this issue of Southern Region Agricultural Conservation it is intended to present concisely the results of experiments dealing with various problems that arise in connection with the growing of winter soil-conserving crops. The organization scheme of the compilation is grouped around three heads, namely, (1) effects of winter soil-conserving crops on yields of succeeding crops; (2) tested practices in relation to yields of succeeding crops; and (3) practices used in growing winter soil-conserving crops which affect the yields of the crop. The scope of the publication is to include a digest of results of all experiments on winter soil-conserving crops published by the experiment stations within the Southern Region and nearby States from 1910 to the present time."

(3796)

EFFECTS OF SUMMER SOIL-CONSERVING CROPS ON YIELDS OF OTHER CROPS. A SUMMARY OF EXPERIMENTAL WORK DONE IN THE SOUTHERN REGION AND NEARBY STATES. Agr. Conserv. South. Region 1, 64 pp. August 1936.

"This issue of Agricultural Conservation in the Southern Region purports to show the effects of summer soil-conserving crops on the yield of succeeding crops in a simple, direct, and usable form. This material has been assembled for the use of persons who have had experience in analyzing and drawing conclusions from experiments conducted by the experiment stations. It is hoped that these data may be helpful to all agricultural workers and farmers of the South."

UNITED STATES BUREAU OF PLANT INDUSTRY. (3797)

WINTER LEGUMES. U. S. Bur. Plant Indus. Rept. 1933: 13. 1933.

Value of winter legumes in the South for preventing soil erosion and improving crop yields is considered.

UNITED STATES EXTENSION SERVICE.

(3798)

THEY PLANTED LESPEDEZA WHEN COUNTY AGENT M'CONNELL ORGANIZED A LEGUME CAMPAIGN. U. S. Ext. Serv. Rev. 7: 185-186, illus. December 1936.

As a result of a successful campaign, 38,927 acres in Barry County, Mo., were planted to legumes. The stands were somewhat thinned by the drought, but reports show that fully three-fourths survived and made rapid growth during September rains.

UNITED STATES SOIL CONSERVATION SERVICE.

(3799)

DAYTON MEETING HEARS ENLOW ON ASIATIC PLANT HUNTING—CONSIDERS AGRONOMIC PRACTICES. Soil Conserv. 2: 116, 130. December 1936.

(3800)

PROCEEDINGS OF SECOND ANNUAL CONFERENCE OF REGIONAL NURSERYMEN, ST. LOUIS, MISSOURI, MARCH 1-6, 1937. U. S. Soil Conserv. SCS-TP-14, 87 pp. Washington, D. C. 1937. [Mimeographed.]

This publication contains the progress reports from Soil Conservation nursery regions 1-11 and papers on cooperative relations between the nursery and other sections and divisions of the Service, by F. W. Herbert, A. D. Stoosz, and B. F. Kiltz, and a paper on cooperative relations between the sections of nurseries and agronomy and range management, by A. S. Dahl. Other papers are on nursery stock and inventorying, nursery plantings, and the nursery program.

VAN DERSAAL, W. R.

(3801)

HANDBOOK OF NATIVE WOODY PLANTS OF THE UNITED STATES. U. S. Soil Conserv. Serv. SCS-TP-11, 287 pp., illus. 1936. [Mimeographed.]

This handbook has been revised and is now in print, under the title "Native Woody Plants of the United States; Their Erosion Control and Wildlife Values." U. S. Dept. Agr. Misc. Pub. 303, 362 pp. 1938.

VAN RENSBURG, J. A.

(3802)

USE OF KIKUYU GRASS IN COMBATING SOIL EROSION. Farming in So. Africa 10: 21, illus. January 1935.

"That it is possible to make the dongas [gullies] silt up at comparatively small cost, without getting the same result in the dams, has been demonstrated in a convincing manner" on a farm where the mean annual rainfall is 15 inches. A description is given and illustrated of the method used, which includes the planting of kikuyu grass, a grass of great binding power.

VON TREBRA, W. H.

(3803)

ADAPTATION TRIALS WITH GRASSES AND OTHER PLANTS FOR SOIL CONSERVATION IN SOUTHERN CALIFORNIA. Soil Conserv. Digest 2: 6-8. August 1936. [Mimeographed.]

Discusses perennials and annuals and gives data gathered from established plots.

WALDROP, J. D.

(3804)

GRASSED SHOULDERS RESIST EROSION. (Letter to editor.) Engin. News-Rec. 103: 627-628. October 17, 1929.

"Where grass has been secured both on the shoulders and on the road-side slopes, a marked difference can be noted in the amount of washing, and sloughing is negligible."

WEAVER, J. E., AND KRAMER, J.

(3805)

RELATIVE EFFICIENCY OF ROOTS AND TOPS OF PLANTS IN PROTECTING THE SOIL FROM EROSION. Science 82: 354-355. October 11, 1935.

"Plant cover, soil, and topography are the major factors concerned in the problem of erosion." Experiments with various wheatgrasses and other field crops in Nebraska for cover and soil-holding efficiency are discussed. Results with winter wheat are shown in a table.

WELLS, B. W.

(3806)

PLANTS DON'T LIE! South. Planter 97: 12-13, illus. March 1936.

The author holds that the nature of the vegetation, shrubbery, trees, etc., indicate the condition of the soil. Data on vegetation types and their relation to soil conditions are given.

- WELTON, KENNETH. (3807)
EROSION CONTROL GRASSES OF THE CORN BELT. Amer. Soil Survey Assoc. Rept. 16: 121-126. 1936.
Table 1 lists grasses that inhabit wild pastures and abandoned fields of the Corn Belt; table 2 lists common grasses of the Corn Belt useful in erosion control.
- WESTOVER, H. L. (3808)
CRESTED WHEATGRASS. U. S. Dept. Agr. Leaflet 104, 8 pp., illus. 1934.
"Crested wheatgrass is a hardy, drought-resistant perennial bunch grass, native to the cold, dry plains of Russia and Siberia." Its characteristics and adaptation in the northern Great Plains is discussed with advice on its cultivation.
- WEYMOUTH, GEORGE. (3809)
"OATS PASSING OUT," THEY SAY. SOY BEANS ARE SHOULDERING THEM ASIDE IN THE ROTATION ON INDIANA FARMS. Ind. Farmer's Guide 92: 3-4, 17. April 17, 1936.
The author points out that as a soil builder soybeans, when properly inoculated, gather nitrogen from the air and thus benefit succeeding rotational crops. Approved methods for planting, harvesting, and cultivating are presented. Illustrations show soybeans in different stages of growth.
- WHITE, J. W. (3810)
PERMANENT GRASSLAND HAS CASH VALUE. Better Crops with Plant Food 21: 6-8, 40-42, illus. January 1937.
Data relative to the soil-building properties of grass in Pennsylvania are presented in an effort to "convince the most skeptical farmer that changes in his present cropping system, involving seeding down cultivated fields to permanent grass, is economically sound."
- WHITTET, J. N. (3811)
PASTURE SEED CERTIFICATION BENEFITS FARMER, PASTORALIST, SEED MERCHANT, AND GROWER. Agr. Gaz. N. S. Wales 47: 605-607, illus. 1936.
The author contends that seed certification is of inestimable value to all concerned. He cites examples of the benefit experienced by replacing poor local strains of grass by certified strains in Australia and New Zealand.
- WILKINS, F. S., AND HUGHES, H. D. (3812)
CHOOSING LEGUMES AND PERENNIAL GRASSES. Iowa Agr. Expt. Sta. Bull. 331, pp. 91-152, illus. 1935.
Legumes of greatest value for different uses of soil conditions in Iowa are listed in order as: Alfalfa, medium red clover, mammoth red clover, alsike clover, white clover, biennial white and yellow sweetclovers, Hubam clover, Korean lespedeza, Dalea, and soybeans. The six grasses of greatest economic importance are Kentucky bluegrass, timothy, reedtop, brome, reed canary, and orchard.
- WILKINSON, H. (3813)
PREVENTION OF SOIL EROSION UP-COUNTRY. Trop. Agr. [Ceylon] 64: 361-363, illus. June 1925.
A short report on tests with the seed of nine varieties of leguminous plants in the up country [Ceylon] at a height of 4,600 feet. Other tests with 12 cuttings of Napier grass, and with *Oxalis* are described and illustrated.
- WILKINSON, W. L. (3814)
RHODES GRASS FOR THE LOWER GULF COAST. Prog. Farmer (Tex. Ed.) 52: 11, illus. February 1937.
Since its introduction in 1913 Rhodes grass has established itself as the best pasture plant for the south Texas coastal region. It is a perennial hay and pasture crop. "On shallow soils it is not especially drouth-resistant, but on a deep soil underlaid with clay, it will stand more dry weather than any grass in this section . . ."

WINTERS, S. R.

(3815)

NEW PLANTS TO CHECK DROUGHT AND DUST. Literary Digest, p. 19, illus. April 13, 1935.

The seeds of thousands of hardy desert plants from the Union of Soviet Socialist Republics, Turkestan, and China for experimental planting in the West are being sent to six agricultural experiment stations for final study before introduction to the soil of the United States. They will be used in an attempt to control soil erosion.

WISCONSIN HIGHWAY COMMISSION.

(3816)

SUGGESTIONS FOR ROADSIDE PLANTING. PRACTICES THAT WILL MAKE WISCONSIN MORE BEAUTIFUL, INCLUDING A RECOMMENDED LIST OF PLANTS SUITED FOR WISCONSIN ROADSIDE PLANTING. Wis. Highway Comm. 20 pp., illus. 1933.

Recommendations are made for controlling soil erosion with such soil-binding shrubs and vines as Japanese barberry, sumac, coralberry, Virginia creeper, and Englemann ivy.

WOLLNY, E.

(3817)

UEBER DEN EINFLUSS DER PFLANZENDECKEN AUF DIE WASSERFÜHRUNG DER FLÜSSE. Met. Ztschr. [Wien] 17: 491-504. 1900.

The writer emphasizes the need for regulating high waters, i. e., excessive rain or floods, so that water may be conserved for dry seasons. The thicker the vegetative cover and the longer it remains the greater the quantity of water absorbed and conserved. Evergreen trees such as pine, etc., use the most and are the best for holding water, other trees and forage plants less so, and crops least of all.

WOODS, A. F.

(3818)

BOTANY AND HUMAN AFFAIRS. Science 81: 573-578. June 14, 1935.

In this general discussion on the relation of plant life and plant forms to the general welfare the author points out that plants are the great soil builders and protectors of soil from wind and water erosion.

COVER CROPS

ANONYMOUS.

(3819)

COVER PLANTS. Trop. Agr. [Ceylon] 63: 65-66, 76-77. August 1924.

"The realization of the serious effects which may accrue as a consequence of soil erosion has reawakened interest in cover plants and during the last few months numerous specimens of indigenous plants which might serve as such have been submitted to the Department of Agriculture for report . . . For the prevention of soil erosion, creeping or prostrate plants are generally to be preferred . . . In selecting such plants it is necessary to exercise some caution, and not to introduce a species which will obviously be difficult to eradicate if and when it is desired to get rid of it." Illustrations are given of *Desmodium triflorum*, *D. heterophyllum*, and *D. heterocarpum*, all of which are nitrogen collectors.

(3820)

SEEDS FOR WINTER COVER CROPS. South. Planter 97: 29. August 1936.

Stresses points to be considered in choosing seed of small-grain crops to prevent soil depletion during winter rains and snow.

(3821)

SOIL EROSION. Planters' Chron. 31: 247. May 30, 1936.

The author reports the results of soil-erosion investigations at the Lyamungu coffee experimental station, Moshi, East Africa, and prevention of topsoil erosion by the use of cover crops and crotalaria hedges planted on low contour bunds 32 feet apart.

(3822)

TOM BROOM BOOSTS LESPEDEZA AND HERE ARE HIS TEN REASONS. Prog. Farmer (Car.-Va. Ed.) 52: 32. February 1937.

The story of Tom Broom, pioneer promotor of lespedeza in the South is told. No. 7 of his 10 reasons is: "It has no superior as a cover crop in preventing soil erosion during the time it has possession of the land."

ANONYMOUS.

(3823)

VEGETABLE GROWERS USE COVER CROPS. Calif. Cult. 84: 442. June 5, 1937.

Recommends barley and vetch as cover crops and gives brief instructions on planting. The article is especially intended for farmers in Monterey County, Calif.

BOND, ARVIS.

(3824)

COVER HOLDS LAND. Capper's Farmer 47: 29. October 1936.

Relates experiences in preventing soil blowing in Yuma County, Ariz., by leaving enough stubble on the land to prevent soil loss and to catch snow.

BROOKS, W. P.

(3825)

GREEN MANURING AND COVER CROPS. Mass. Agr. Expt. Sta. Cir. 37, 6 pp. 1914. (Revised, 1915.)

Among other things this circular points out the benefits of green manuring and cover crops in checking soil erosion.

CHEN, F. S.

(3826)

INVESTIGATIONS OF COVER PLANTS IN THE FOREST IN RAN-CHI HSEIN. Jour. Agr. Assoc. China 149: 31-50. June 1936. [In Chinese.]

Not examined.

CLEARY, C. W., JR.

(3827)

WINTER GREEN MANURE COVER CROPS FOR CALIFORNIA. Soil Conserv. Digest 3: 10-13. October 1936. [Mimeographed.]

The author lists various crops and discusses their use and adaptability. Suggests the combined use of a cereal and a legume as an erosion-control measure. Barley and wheat are recommended as cover crops.

COOKE, M. L.

(3828)

DAMS ARE NOT ENOUGH. Amer. Forests 42: 251-252, 286, illus. June 1936.

Emphasizes the importance of forest cover and forest litter, soil-building leguminous crops, and matted grass cover to hold water and control erosion.

EUSTACE, H. J.

(3829)

WINTER VETCH FOR A COVER CROP IN MICHIGAN ORCHARDS. Mich. Agr. Expt. Sta. Cir. 13, 4 pp., illus. 1911.

Discusses the value of a cover crop in an orchard or vineyard and gives brief directions for the culture of winter vetch, which the Michigan station found to be especially valuable for the purpose.

GOSS, W. L.

(3830)

MUSTARDS USED AS COVER CROPS. Calif. Dept. Agr. Bull. 25: 341-348, illus. 1936.

Plant descriptions are based on trial plantings of the various mustards offered as cover crops for California orchards. "These winter-growing plants hinder soil erosion, prevent leaching and supply vegetable matter to be turned under with the spring working of the orchard."

GRUNDER, M. S.

(3831)

GREEN MANURE OR COVER CROPS IN WESTERN WASHINGTON. Wash. State Col. Ext. Bull. 223, 4 pp. 1936.

This bulletin indicates the beneficial effects of green-manure crops and lists crops that may be used for green manure and suggests management practices. "The growing of green manure crops is an economical method of adding organic matter to the soil."

HESTER, J. B.

(3832)

THE VALUE OF COVER CROPS IN POTATO PRODUCTION IN EASTERN VIRGINIA. Amer. Potato Jour. 14: 9-18. January 1937.

Experiments as to the influence of cover crops on the yield of potatoes were made at the Virginia Truck Experiment Station, Norfolk, Va., and results given. The yield and composition of cover crops, results of fourth year of rotation, and scientific data on soil characteristics are discussed and analyzed.

HILL, H. H.

(3833)

THE CONSERVATION OF PLANT NUTRIENTS BY THE USE OF RYE AS A COVER CROP. Va. Fruit 24: 108-112. January 1937.

"Rain water scouring the countryside, rushing down hillsides, gouging out gullies, and sweeping over gentle slopes of cultivated fields, carries away to the ocean many millions of tons of soil." The author describes the results of studies in the use of rye as a cover crop. He gives detailed data on experiments made in Virginia.

HUNT, R. A.

(3834)

SOIL MANAGEMENT FOR TOBACCO. Prog. Farmer (Ky.-Tenn. Ed.) 52: 6. January 1937.

The author stresses the necessity for cover crops on tobacco land as soon as possible after removal of growing crop. He discusses the respective values of small grain, orchard grass, and legumes for this purpose.

KELL, W. V., AND MCKEE, ROLAND.

(3835)

COVER CROPS FOR SOIL CONSERVATION. U. S. Dept. Agr. Farmers' Bull. 1758, 14 pp., illus. 1936.

Crops suitable for soil conservation and the regions to which they are adapted are discussed.

KINMAN, CHARLES F.

(3836)

COVER CROPS FOR PORTO RICO. Porto Rico Agr. Expt. Sta. Bull. 19, 32 pp., illus. 1916.

The author explains that up until 10 years ago cover cropping was seldom heard of and rarely practiced in Puerto Rico. "The absence of the most suitable plants to use as cover crops and the meager knowledge of promising wild plants were largely responsible for the lack of their appreciation by the farmers in former years." Leguminous crops found valuable include cowpeas, jackbeans, swordbeans, pigeonpeas, species of velvetbeans, and several wild plants. The habits of these crops and their suitability to economic conditions are discussed.

MCWHORTER, O. T., JACKMAN, E. B., AND KING, ARTHUR.

(3837)

ORCHARD SOIL COVERS. Oreg. Agr. Col. Ext. Bull. 506, 20 pp., illus. August 1937.

Discusses cover crops for irrigated and nonirrigated orchards, the seeding of cover crops, orchard cultivation, cover-crop aids, sod covers, fertility values in organic matter, and erosion-control methods for orchards.

MERKLE, F. G.

(3838)

EQUIPMENT FOR DEMONSTRATING SOIL EROSION AND ITS CONTROL. Jour. Amer. Soc. Agron. 26: 626-628, illus. July 1934.

Equipment is described in detail with which it is possible to make several comparisons of soils and to demonstrate the effect of soil cover upon erosion: bare subsoil; bare surface soil; rape cover crop, 7 weeks old; rye and vetch cover; crimson clover cover; timothy, 7 weeks old; old bluegrass sod; section of forest floor, with regard to surface run-off.

MORGAN, J. O., AND TAYLOR, W. S.

(3839)

SCHOOL HOUSE MEETING. DISCUSSION OF COVER CROPS. Tex. Univ. Bull. 59, 17 pp., illus. 1915.

This bulletin is comprised of questions and answers with an address by A. C. Ellis who says in part: "In addition to acquiring the general information given in the discussion below, it will be necessary to make experiments in every locality in order to find what is best suited to the soil, climate, farm needs and market facilities of that section. Each one should try out a fraction of an acre in rape, one or more legumes, cereals, and winter root crops, in order to learn the best times and methods of planting and handling these crops and to find out which are best suited to his needs."

MUSGRAVE, M. E.

(3840)

EVEN POOR COVER IS BETTER THAN NONE. Soil Conserv. 1: 13. March 1936.

- PENNY, C. L. (3841)
REPORT OF THE CHEMIST [FIELD CROPS]. Del. Agr. Expt. Sta. Rept. 15: 97-116. 1903.

"Cover crops.—A study of various cover crops was made and the yield and composition of the portion of the crops above ground and of the roots is tabulated, together with their money valuation as green manures. Data with reference to the moisture content of the surface soil under the different crops are also given."—Expt. Sta. Rec. 18: 1035. 1903.

- PERRY, G. D., Jr. (3842)
GIANT BUR CLOVER PROMISING. Prog. Farmer (Miss. Valley Ed.) 51: 6, illus. August 1936.

The author gives results of experiences in growing giant bur clover as winter cover crop on his farm in Tunica County, Miss. He claims that this crop "... reaches the stage for turning under about two weeks ahead of such cover crops as hairy vetch or Austrian winter peas."

- POHLMAN, G. G., AND HENDERSON, H. O. (3843)
THIRTEEN YEARS' RESULTS WITH COVER CROPS. W. Va. Agr. Expt. Sta. Bull. 275, 12 pp. 1936.

The experiment reported was started in order to determine the value of different cover crops in increasing crop yield. Corn and soybean yields following different cover crops are presented. One of the author's conclusions follows: "(1) Rye, rye-and-vetch, and vetch increased the yield of both corn silage and soybean hay. The increase was the greatest on the plots having a cover crop of rye and vetch."

- POWELL, R. A. (3844)
TOP SOIL. Capper's Farmer 47: 9, illus. November 1936.

The story of soil conservation in the Schleswig community in western Crawford County, Iowa, is told. The soil is of loessial type, subject to washing, but due to crop-rotation practices about two-thirds of the land is protected by cover nearly all the time.

- PROEBSTING, E. L. (3845)
EFFECT OF COVER CROPS ON THE SOIL SOLUTION AT DIFFERENT DEPTHS UNDER ORCHARD CONDITIONS. Hilgardia 7: 553-584. August 1933.

"In preceding reports, the data have been based on analyses from composite samples of the upper 4 feet of soil. Because many roots penetrate to greater depths, analyses have been made of the soil solution obtained to a depth of 8 feet. The present report shows the results of four composite samples of 2 feet each to a total depth of 8 feet . . . In order to conserve space in the presentation data, the major results of only one season, 1930, will be reported." Nitrate content of soil solution in peach and pear series is given in tables, as are also sulphate, bicarbonate, chloride, calcium, magnesium, and potassium content. Tables show the total kilograms of fruit borne by trees in the cover-crop experiment.

- RICHARDSON, T. C. (3846)
COVER CROPS MAKE MORE COTTON AND BETTER HOMES. Farm and Ranch 56: 2, 10-11. February 15, 1937.

Results of experiments at the North Louisiana Experiment Station prove the case for leguminous winter cover crops.

- SALGADO, M. L. M. (3847)
QUESTIONNAIRE ON COVER CROPS AND GREEN MANURES IN RELATION TO COCONUT CULTIVATION. Trop. Agr. [Ceylon] 87: 202-209. October 1936.

"The replies to the questionnaire" sent out in Ceylon "indicate that there is a general belief, as the result of experience, that the growing of cover crops has definite advantages such as reducing the cost of weeding and maintaining a healthy appearance of the palms . . . What has to be determined is whether the growing of covers bring about a definite increase in crop yield . . . Field experiments that are contemplated by the Coconut Research Scheme will aim at the elucidation of these points."

SHUTT, F. T.

(3848)

THE CONSERVATION OF MOISTURE IN ORCHARD SOILS. Canada Expt. Farms Repts. 1903: 129-134. 1903.

Comparative data as to the factors that affect the soil moisture content, obtained from the Central Experimental Farm orchard, are given. The value of legumes as orchard cover crops is stressed, and experiments with hairy vetch, soybeans, and horsebeans as cover crops are described.

(3849)

THE RELATION OF "COVER" CROPS AND CULTIVATION TO SOIL MOISTURE. Canada Expt. Farms. Repts. 1901: 149-152; 1902: 137-139.

Data obtained in the orchards of the experimental farm at Ottawa as to the value of cover crops followed by bare cultivation are given. Tables on rainfall, and the plan of the system and the principles underlying it are described. The investigation, continued in the second report, comprised two series of experiments. "The first was to learn the effect upon soil moisture-content (a) by cultivation throughout the entire season, (b) by cropping with clover . . . followed by ploughing and cultivation . . . and then resown with clover, and (c) by the growing of clover throughout the season. The second series was planned to ascertain the difference in moisture-content between soil cultivated throughout the season and that kept in sod."

SPRAGUE, H. B.

(3850)

THE VALUE OF WINTER GREEN MANURE CROPS. N. J. Agr. Expt. Sta. Bull. 609, 19 pp., illus. 1936.

"The experiments reported herein were conducted to determine the relative value of various winter green manure plants . . . The following experiments were conducted with corn as the main crop, using seven types of green manures planted in standing corn . . . The sum total of these tests indicates that winter green manures, even the most productive type, are not adequate for maintenance of soil productivity over an extended period of cropping to corn."

STEPHENS, J. L.

(3851)

WINTER LEGUME COVER CROPS FOR THE COASTAL PLAIN OF GEORGIA. Ga. Coastal Plain Expt. Sta. Bull. 23, 44 pp., illus. 1934.

In 32 tables, green- and dry-weight yields of various cover crops are presented. Among recommended winter legumes are Austrian Winter peas, vetches, horsebeans, serradella, lupine, Tangier peas, crimson clover, and bur-clover.

STEPHENSON, R. E.

(3852)

COVER CROPS AND SOIL MOISTURE. Oreg. State Hort. Soc. Ann. Rept. (1935) 27: 168-175. 1936.

"Oregon orchard soils need cover crops to supply humus, and for their favorable effects upon the physical condition of the soil . . . This discussion applies primarily not to those soils definitely unfitted, but rather to those deeper, better suited soils, for which a change in cover crop practice may enable the grower so to conserve the moisture as to justify the expectation of a reasonable harvest."

TENNESSEE COLLEGE OF AGRICULTURE.

(3853)

WINTER COVER CROPS FOR PASTURE AND SOIL CONSERVATION. Tenn. Agr. Col. Ext. Serv. Pub. 188, 8 pp., illus. 1935.

"Soil erosion has damaged more than 85 percent of all the land in Tennessee . . . Gullies have practically destroyed 3,000,000 acres for profitable cultivation and on approximately 11,000,000 acres, sheet erosion has been so severe that from 75 to 100 percent of the top soil has been removed." Statistics on loss of plant food are presented. Benefits of terracing and specific advantages from growing winter cover crops, together with tables on what to grow, are discussed.

WAHLBERG, H. E.

(3854)

IT'S COVER CROP TIME AGAIN. Calif. Cult. 83: 692-693. September 26, 1936.

Discussion of the values and reasons for the planting of cover or green-manure crops.

YODER, FRED.

(3855)

RYE AS A COVER CROP. Ohio Farmer 178:15. July 18, 1936.

It is found that "rye makes an excellent cover and green manure crop, when sown on corn ground early in the fall . . . because it starts quickly and grows luxuriantly both in the fall and spring. Its good growth in the spring supplies an abundance of green manure to plow under."

TILLAGE PRACTICES

ANONYMOUS.

(3856)

CUTTING LOSSES FROM SOIL EROSION; FARMERS IN WEST TARKIO WATERSHED EXPERIMENT TRY TERRACING, STRIP COPING AND CONTOUR PLOWING. Wallaces' Farmer 62: 3, 22-23, illus. April 10, 1937.

Soil conservation in southwestern Iowa and Northwestern Missouri and the use of buffer strips on untterraced fields are discussed.

(3857)

FIND NEW USE FOR "CHISEL" PLOW. PROVES USEFUL IN PREVENTING SOIL EROSION. Wash. Farmer 62:176. March 18, 1937.

Describes use in erosion-control work in the Pacific Northwest.

(3858)

JEFFERSON'S CROP ROTATION. Fert. Rev. 11: 16. April-May-June 1936.

Thomas Jefferson's 7-year crop rotation for soil conservation is described.

(3859)

LISTER LEAVES SMALL DAMS IN FURROWS TO HOLD WATER. Pop. Mech. 66:560, illus. October 1936.

(3860)

MORE MOISTURE STORAGE POSSIBLE WITH THE BASIN LISTER. Impl. and Tractor 51: 13, illus. August 8, 1936.

It is pointed out that the basin lister checks the water run-off and obviates the necessity for contour farming on all except the more extreme slopes of the western prairies.

(3861)

NEW "BASIN" LISTER WORKED WELL IN TEST. Farm Impl. News 57: 17. July 16, 1936.

The merits of the basin lister attachment developed by engineers of the United States Bureau of Agricultural Engineering and Iowa State Experiment Station are discussed. "Listing is . . . one of the best ways of checking wind erosion, the furrows catching and holding drifting particles of soil . . ."

(3862)

ROUGH TILLAGE AS AN EROSION CHECK. Northwester 3: 3. May-June 1936.

"Farmers in the Big Bend Country and in other areas of the Northwest subject to blow, who have worked their land so that the trash and clods are near the surface, have succeeded in holding their soil against blowing."

(3863)

TEN THOUSAND HOLES AN ACRE PREVENT SOIL EROSION. Pop. Mech. 56: 356, illus. September 1931.

A farm implement that prevents soil erosion by leaving a field in alternating hills and holes is described. "Alternating shovels work up and down with the forward motion of the plow, scooping out dirt and piling it at regular intervals. The machine leaves 10,000 such holes per acre, each having capacity of about three gallons of water."

(3864)

TERRACE MAINTENANCE. Prog. Farmer (Car.-Va. Ed.) 52: 25. March 1937.

The method of plowing recommended by the Soil Conservation Service and the Alabama Extension Service is described.

ANONYMOUS.

(3865)
THEY CONQUER THE SAND. Ext. Serv. Farm News 15: 1, 8. October 1929.

Deep plowing demonstrations in Gaines County, Tex., shows the way to better crops. The cost is not prohibitive.

(3866)
TILLAGE, WILDLIFE, AND WEEDS. Northwester 3: 1-2. March-April 1936.

Presents the advantages of such tillage as chiseling, which stirs up the soil without inverting it and without exposing the subsoil. Includes results of observations made on pea land and wheat land for several types of tillage operations.

(3867)
WIND EROSION PROJECT BEING RUSHED IN STATE. West. Farm Life 38: 24. April 15, 1936.

Describes progress of wind erosion-control projects in eastern Colorado. Committees have been set up in 22 counties to direct the listing of 1,500,000 acres of land.

AHLSON, C. B.

(3868)
TILLAGE OF LAND FOR EROSION CONTROL. Soil Conserv. Digest 2 (12): 3-5. September 1936. [Mimeographed.]

Recommends and describes the damming lister in contour ridging.

ANDREWS, CHESTER.

(3869)
WATER IN THE GROUND. Capper's Farmer 47: 11, 36, illus. March 1936.

Describes equipment used in the Plains for maximum water conservation. A combination tilling, seeding, and planting machine, equipped with damming attachment, is used which leaves dams in the furrows at every tilling operation. The dams are about 2 inches higher than the ridges so that ridges must fill to capacity before any run-off can occur.

BEELER, M. N.

(3870)
FLUFFY SOIL. Capper's Farmer 47: 10, illus. 1936.

Gives cultivation methods used by Elmer Larsen, farmer in Platte County, Wyo., to conserve moisture and prevent blowing on light, fluffy soil 7 inches in depth.

(3871)
WHAT METHOD OF FALLOW? Capper's Farmer 48: 13, illus. May 1937.

The author compares three common practices for fallow, which at the most brought about moisture penetration of only 45 inches, with a more recent development of listing furrows. Examples of the latter are mentioned, some of which caused soil to be wet to a depth of 60 inches, through use of a damming lister.

BIRD, J., Jr.

(3872)
ANTI-EROSION MACHINE. Country Gent. 101: 24, illus. November 1931.

The writer describes a new tillage implement that digs small depressions in the soil to hold moisture and prevent erosion.

BIRD, J. A.

(3873)
A NEW MOISTURE-SAVING MACHINE. Country Gent. 106: 68, illus. August 1936.

This article describes the dam-listing machine which was designed and constructed at the Fort Hays, Kans., experiment station machine shop under the direction of Louis C. Aicher. It is found that "the machine provides a safeguard against run-off of water and soil no matter how the lands of a field are laid out."

BURDICK, C. K.

(3874)
YOU CAN MAKE THIS DAMMER. Capper's Farmer 47: 4. August 1936.

Describes in detail the Aicher machine for basin listing, with directions for using. States that "on slopes, unless the work is on contour, ordinary listing carries water away instead of forcing it to soak into the ground. The damming attachment will permit straight rows on moderate slopes. We had one field which was basin listed and no water ran from 4 per cent slopes in a 2½ inch rain that fell in 30 minutes."

- BURDICK, R. T.** (3875)
 CONCERNING TILLAGE. Vt. Agr. Expt. Sta. Bull. 198, 83 pp., illus. 1916.
 Tillage methods dating back to Mesopotamian husbandmen are discussed. The author offers 14 functions of tillage which have vital relation to crop production. Tillage implements and the requirements of various crops are among the points discussed.
 Literature cited, p. 83.
- CALL, L. E., AND SEWELL, M. C.** (3876)
 THE SOIL MULCH. Jour. Amer. Soc. Agron. 9 (2): 49-61. 1917.
 "The purpose of this paper is to review the experiments in soil mulches which have been conducted and to present certain results which do not conform to accepted teachings." Presents data which show that (1) a cultivated soil is no more effective than a bare uncultivated soil in preventing evaporation, (2) cultivation conserves soil moisture by the elimination of weeds and by preventing run-off, and (3) the development of nitrates may be as extensive without cultivation as with cultivation.
- CHARLES, TUDOR.** (3877)
 SHOW BASIN-LISTER AT ROUND-UP. MAKES DAMS EVERY 10 FEET IN FURROWS TO HOLD WATER. Kans. Farmer 74: 8, illus. April 25, 1936.
- CHEPIL, W. S.** (3878)
 PLOWLESS SUMMER FALLOW AS A SOIL DRIFTING CONTROL MEASURE. Dakota Zephyr 2: 21-22. March-April 1936. [Mimeographed.]
 Recommends summer-fallow methods as practiced in western Canada for the control of soil drifting, moisture conservation, and effective weed control. Tillage should be conducted in such a way as to leave unbroken stubble on the surface of the ground. Gives directions for using the duck-foot cultivator for first tillage on land to be summer fallowed.
- CHILCOTT, E. C., AND COLE, J. S.** (3879)
 SUBSOILING, DEEP TILLAGE, AND SOIL DYNAMITING IN THE GREAT PLAINS. Jour. Agr. Research 14: 481-521. September 9, 1918.
 "The quite general popular belief in the efficiency of deep tillage as a means of overcoming drought or of increasing yields has little foundation in fact, but is based on misconceptions and lack of knowledge of the form and extent of the root systems of plants and of the behavior and movement of water in the soil."—Expt. Sta. Rec. 39: 812. 1918.
- CLEGHORNE, W. S. H.** (3880)
 PREVENTION AND CURE OF SOIL EROSION. Farming in So. Africa, 6: 105-106, 114, illus. June 1931.
 The manner in which a Cape farmer has solved the problem of soil erosion by applying a system of contour banking in badly eroded areas is described. An overflow weir and a ditcher plow are illustrated.
- CLOUGH, A. J.** (3881)
 ROUGH SURFACE HOLDS SOIL. Capper's Farmer 47: 32. June 1936.
 Suggests tillage with an implement that will throw up clods and leave furrows to catch moisture and force it into the ground. Contour cultivation is advocated by an Adams County, Colo., farmer.
- CURRY, J. B.** (3882)
 SPECIAL ORCHARD CULTIVATION EXPERIENCES. Hoosier Hort. 11: 139-142. September 1929.
 The writer states: "I am going to confine my remarks to this particular tool that we put into operation a few years ago, known as a 'killifer.'" On the point of terracing his land against soil washing the writer finds that the use of this tool may be substituted for terracing to prevent soil washing. A description of the killifer is given, with the cost.
- DEHÉRAIN, P. P.** (3883)
 SOIL WATER. Gard. Chron. [London] (3) 25 (630): 34. 1899.
 "A scientific presentation in popular style of the principles governing the operations of tillage in their relation to control of soil moisture."—Expt. Sta. Rec. 10: 730. 1898-99.

- DICKEY, P. B. (3884)
 INTENSE RAINS BRING OUT VALUE OF CONTROLLING RUN-OFF TO SAVE SOIL AND WATER. U. S. Soil Conserv. Serv. Digest (Cal.-Nev. News Letter) 3 (6): 4-7. March 1937. [Mimeographed.]
 Points out the advantages of level basin terraces for water conservation, terracing combined with subsoiling, basin furrows, and basin listing. Moisture penetration through fertilized and unfertilized soils is also considered.
- DRAKE, R. R. (3885)
 SOIL MOISTURE CONSERVATION. Agr. Engin. 18: 15-16. January 1937.
 This paper contains comments which have particular reference to the central Great Plains area, and to wheat-growing experiments. Basin-lister tillage experiments are indicated to have shown favorable results. Presented before the soil and water conservation division at the annual meeting of the American Society of Agricultural Engineers at Estes Park, Colo., June 1936.
- ESSELEN, D. J. (3886)
 DOES CULTIVATION CONSERVE SOIL MOISTURE? Farming in So. Africa 12: 6-12, illus. January 1937.
 The results of an experiment at the subtropical horticultural research station, Nelspruit, South Africa, comparing the rates of water lost from a sandy soil under four treatments, viz, soil mulch, straw mulch, nonmulch, and supporting a stand of weeds, are presented. Some of the fallacies and misinterpretations which have given rise to the mistaken value placed on a soil mulch as a factor in conserving soil moisture are explained.
- GIANNOLI, I. (3887)
 PLOUGH AS A MEANS OF MAKING GRADUALLY SLOPING TERRACES. Internatl. Rev. Sci. and Pract. Agr. [Rome] 12 (11): 1381-1385, illus. November 1921.
 "The author has made a study of a method of terracing . . . devised to avoid as far as possible the difficulties of the system which consists in cutting the hills across by rows of vines and by ploughing transversely between the rows. With this method, since the soil is constantly being turned from above, there is a gradual terracing of the slope." Illustrations show the method in practice.
- HARDY, E. A. (3888)
 THE USE OF TILLAGE MACHINERY IN SOIL-DRIFTING AREAS. Sci. Agr. 16: 281-284, illus. January 1936.
 "When working the land the correct machine should be used for a definite purpose." The author gives specific data regarding various implements for use in tillage and weed control. Paper read before a joint session of the Western Canadian Society of Agronomy, soils and agricultural engineering groups of the Canadian Society of Technical Agriculturalists at the University of Alberta, Edmonton, Canada, June 26, 1935.
- HARPER, H. J. (3889)
 STUDIES ON THE USE OF THE TERRACING PLOW FOR SOIL CONSERVATION. Jour. Amer. Soc. Agron. 28: 301-309, illus. April 1936.
 "The terracing plow is an important agricultural implement because it can be used to build terrace ridges or it can be converted into a general-purpose plow by replacing the terracing wing with a standard moldboard." Types, designs, and costs are presented in a discussion of experimental work conducted at the Oklahoma Agricultural Experiment Station.
- HEAD, PHIL, AND HALLOWAY, L. E. (3890)
 WE WENT TO MEXICO TO SEE THE BOLSAS. Indians at Work 4: 10-15, illus. June 1, 1937.
 "The Spanish term 'Bolsa' means pocket. The water is literally run into a pocket and left there to soak into the ground, after which the ground is plowed and harrowed and well pulverized, and the seed planted. Fine corn, beans, and cotton are raised without any more water being used. If the crop is cultivated and soil kept loose, the moisture does not evaporate. The Mexican *bolsa* system of utilization of flood waters for crop raising is a very ingenious way to make the most of a meager rainfall."

HEIMPEL, L. G. (3891)
GIVE THE CROPS A CHANCE. Jour. Agr. and Hort. 25: 135, XV, XVI. April 1922.

Advocates and describes underdrainage as a preliminary step to tillage in soil and water conservation.

HENDERSON, C. D. V. (3892)
THE NECESSITY FOR HILLSIDE TRENCHING. Jamaica Agr. Jour. 38: 567. September 1934.

The necessity for hillside trenching, and the great benefits to be derived from exercising proper care in this direction are stressed. The author says that leguminous cover crops are particularly useful in preventing erosion on hillsides. Trenching improves soil texture, and drained lands are warmer and therefore produce earlier.

IMLAY, D. M. (3893)
URGES CONSERVATION OF WATER. PATEROS MAN SAYS EVERY DROP IS VALUABLE. Wash. Farmer 62: 163. March 18, 1937.

"There is one phase of the conservation question that it seems to me has not been given the attention and prominence that it deserves, and that is subsoiling or gashing, always paralleling the hillsides in any working. Why cannot we attach a digger-spring-tooth-jump spring or a break-pin tooth behind each plow or disk to gash the soil, narrow but deep as it can be run . . . This would leave plenty of hard soil for plants that prefer a solid base and let the water in deep so as not to puddle and bake the surface. There would be less evaporation and conserving conditions would be better."

JONES, G. D. (3894)
ROOT BED THAT RESISTS EROSION. Farm Impl. News 55: 20, illus. March 29, 1934.

The author sketches studies and experiments in soil-erosion control and improvement in root-bed structure. Instructions for aerating soil are given together with a description of the implement used.

KELL, WALTER V. (3895)
TURNING THE EARTH UPSIDE DOWN WITH A 4-FOOT PLOW. Soil Conserv. 2: 123, illus. December 1936.

A plow that turns a 4-foot furrow is being used in southern California to restore fertile soil to the surface.

KING, F. H. (3896)
INFLUENCE OF DEEP AND SHALLOW CULTIVATION ON THE WATER CONTENT OF THE SOIL. Wis. Agr. Expt. Sta. Rept. (1892) 9: 101-105. 1893.

In this article the results of investigations on the determination of the relative yields of corn under treatment of deep and shallow cultivation, and studies on the changes in the water content of the soil are reported.

THE MAXIMUM DUTY OF WATER. THE EXTENT TO WHICH TILLAGE MAY TAKE THE PLACE OF IRRIGATION. Irrig. Age. 14: 127-137. 1900.

"It is very important to know what is the minimum amount of water which, under stated climatic conditions can meet the needs of a given crop, producing a paying yield . . . only such knowledge . . . can show how economical or how wasteful our methods of tillage may be . . ." The Wisconsin station has made studies which the author discusses and describes, along with observations and experiments with regard to rainfall in various States.

KLEIN, JACK. (3898)
DEEP PLOWING. Calif. Cult. 83: 183. February 29, 1936.

Describes a plow invented by Paul Plavan of California, for plowing and mixing soils with sand layers deposited by floods. Deep plowing with the machine is said to achieve control of wireworms, nematodes, and Bermuda grass.

- LEVINE, C. O. (3899)
 PREVENTING SOIL WASH. *Hoard's Dairyman* 51: 815, illus. June 9, 1916.
 Crop rotations and deep plowing are recommended for hilly rolling lands.
- LYON, T. L. (3900)
 CONSERVATION OF SOIL MOISTURE BY MEANS OF SUBSOIL PLOWING. *Nebr. Agr. Expt. Sta. Bull.* 43: 101-107, illus. 1895.
 "Subsoil plowing, although a means of conserving moisture, does not produce it, and is therefore, not a substitute for irrigation where the rainfall is too small to produce crops." The author offers suggestions concerning types of soil suitable or unsuitable to subsoil plowing.
- MCCALL, M. C., AND WANSER, H. M. (3901)
 THE PRINCIPLES OF SUMMER FALLOW TILLAGE. *Wash. Agr. Expt. Sta. Bull.* 183, pp. 6-77, illus. 1924.
 "The result of studies on the subject conducted in cooperation with the U. S. Department of Agriculture are summarized. It is concluded that the summer fallow system is necessary in eastern Washington dry farming because of the seasonal distribution and amount of precipitation, the purpose being to conserve moisture and to accumulate nitrate nitrogen. Climatic conditions divide the fallow period into distinct sub-periods, emphasizing either absorption or retention . . ."—*Expt. Sta. Rec.* 52: 620. 1925.
- MCCRORY, S. H. (3902)
 STUDIES IN WATER CONSERVATION. *Calif. Cult.* 80: 213, 225. April 29, 1933.
 Recommends, as a basic factor in water conservation, proper tillage practices by farmers. The control of soil erosion by terracing is also suggested as an important factor in water conservation.
- MCDOLE, G. R., AND BERESFORD, HOBART. (3903)
 CHISEL ATTACHMENT FOR THE MOLD-BOARD PLOW. *Idaho Agr. Col. Ext. Cir.* 41, 11 pp., illus. 1932.
 "This circular contains directions for converting a plow into a deep tillage tool by the replacement of the mold board and share with a chisel-shaped point made of an old plow beam or automobile axle." Gives the value of deep tillage under local conditions at a minimum cost. Pertinent questions are asked and answered by the authors.
- McKEE, C. (3904)
 SUMMER TILLAGE IN MONTANA. *Mont. Agr. Expt. Sta. Cir.* 102, 4 pp. 1922.
 "The province of summer tillage and the reasons for the practice are specified, preparatory treatments for land to be summer tilled are offered, with suggestions for the care of summer-tilled land after plowing, and methods of seeding crops following summer tillage are briefly outlined."—*Expt. Sta. Rec.* 47: 432. 1922.
- McKINNEY, GEORGE. (3905)
 EASY GRADES. *Capper's Farmer* 48: 8, illus. January 1937.
 Contouring and strip cropping afford three primary advantages according to Earl Brown, Fremont County, Iowa: "1. They prevent serious water erosion; 2. Force moisture into the soil where it is stored for use of crops; and 3. Conserve tractor and horse power."
- MARSHALL, E. G. (3906)
 HELPS RAIN SOAK IN. *Capper's Farmer* 47: 4. April 1936.
 The efficiency of the old-time subsoiler is extolled. Attached to modern farm equipment it follows in the plow furrow and makes a reservoir for moisture. A detailed description of its construction is given by the author who has used it with complete success.
- MOSS, B. L. (3907)
 HOW TO REDUCE LAND WASHING TO A MINIMUM. *Prog. Farmer* (Eastern ed.), 34: 1878, illus. November 22, 1919.
 Good terracing on hillside or rolling lands is one effective measure for the reduction of soil washing. Other aids are cover crops, both winter and summer, and deep plowing.

- MULLEN, C. W. (3908)
 REVOLUTION IN TILLAGE. *Farmer-Stockman* 49: 3, 15, illus. January 15, 1936.
 Western farmers are setting pattern for those in the East in erosion control. A description of successful contour farming in Texas County, Okla., and of the results of nonterracing in eastern Oklahoma.
- OGAARD, J. A. (3909)
 SUMMER TILLAGE IMPLEMENTS. *Mont. Agr. Col. Ext. Cir.* 79, 43 pp., illus. 1926.
 "Information relating to various types of implements used for summer tillage by many dry land farmers throughout the northwest is presented."—*Expt. Sta. Rec.* 56: 282. 1927.
- AND MURDOCK, H. E. (3910)
 CONSTRUCTION AND USE OF HOMEMADE IMPLEMENTS FOR SUMMER TILLAGE. *Mont. Agr. Col. Ext. Cir.* 4, 8 pp., illus. 1921.
 "This circular has been prepared to answer inquiries regarding the construction and use of homemade tillage implements, designed for effective summer tillage, more especially under the dry farming conditions of Montana . . ."—*Expt. Sta. Rec.* 47: 293. 1922.
- PARSONS, E. R. (3911)
 FALL PLOWING HOLDS KEY. IT AIDS IN CONSERVATION AND RETENTION OF SOIL MOISTURE FOR 1937 PLAINS CROPS. *West. Farm Life* 38: 2. August 15, 1936.
 Discusses fall plowing and winter fallowing for conservation of snow and rain moisture in Plains soils.
- (3912)
 SUMMER CULTIVATION CONSERVES SOIL MOISTURE. *West. Farm Life* 35: 3. June 15, 1933.
 Recommends the duckfoot cultivator which leaves a cloddy surface increasing the porosity of the soil and minimizing run-off.
- REYNOLDS, J. B. (3913)
 THE EFFECT OF SURFACE CULTIVATION ON THE MOISTURE OF THE SOIL. *Ont. Agr. Col. and Expt. Farm Rept.*, pp. 4-5. 1898.
 "This is an account of observations during May, June, and July on the moisture content (at depths of 1, 2 and 3 feet) of plats, 1 rod square, on some of which the soil was kept loose and on the rest compact . . ."—*Expt. Sta. Rec.* 11: 625. 1899-1900.
- RICHARDSON, L. S. (3914)
 MACHINE DESIGNED TO MAKE FIELDS RESISTANT TO SOIL EROSION. *Farm Impl. News*, p. 20. July 9, 1931.
 A soil-erosion specialist, R. H. Davis, invented a new tillage implement. "The new machine which is a sort of hybrid cultivator, can be used for row crops or to prepare the surface soil when the land is to be left fallow . . . It consists of a set of alternating shovels that work up and down, so that with the forward motion of the machine the shovels scoop out dirt and leave holes in the ground. The holes—10,000 of them to the acre—catch the run-off water after heavy rains and delay it until it has time to soak into the ground . . . The capacity of each hole is about 2 or 3 gallons."
- RUFFIN, EDMUND. (3915)
 ADDRESS ON THE OPPOSITE RESULTS OF EXHAUSTING AND FERTILIZING SYSTEMS OF AGRICULTURE. *S. C. Inst. Ann. Fair* 4, 26 pp. 1853.
 In this article on agricultural policies and practices affecting soil fertility, the author points out the value of "judicious tillage" in soil conservation.
- (3916)
 AGRICULTURE FEATURES OF VIRGINIA AND NORTH CAROLINA. *De Bow's Rev.* (3) 22: 462-479, May 1857; 23: 1-20. July 1857.
 The writer states that he is confining himself to a sketch of the "agricultural features, condition, wants (and errors of culture,) and capabilities of the particular and peculiar agricultural region which lies between the Chesapeake Bay and Hampton Roads and Nansemond River, on the north, the ocean on the east, and Albermarle Sound on the south . . . The area designated includes some of the oldest agricultural settlements and oldest towns, and . . . some of the richest lands on our Atlantic border." Proper drain-

age is the point stressed, and the usual and general plan of draining and its radical defects is described. In the second article the writer gives examples of the effects of the true principle of drainage, in both artificial and natural operations. Some of the farming practices of the lowlands with their defects and proposed improvements are discussed, as well as rotation of crops, pea fallow, and narrow and broad-bed tillage. He further describes a system of flush plowing of land which proved entirely satisfactory to him and to E. H. Herbert, of Princess Anne County.

- SANBORN, J. W. (3917)
RELATION OF TILLAGE TO SOIL MOISTURE. Mo. Agr. Expt. Sta. Bull. (1) 5:
15-17. 1883.

Results of experiments for the purpose of testing the relation of various methods of tillage to soil moisture and crop growth are cited. "Crop tillage decreases the moisture of the area tilled, or hastens its evaporation, and economises the great reservoir of moisture beneath the area stirred. Hence, deep tillage in times of drought of surface rooted crops, like corn, is an erroneous practice . . ."

- SARVIS, J. T., AND THYSELL, J. C. (3918)
CROP ROTATION AND TILLAGE EXPERIMENTS AT THE NORTHERN GREAT PLAINS FIELD
STATION, MANDAN, N. DAK. U. S. Dept. Agr. Tech. Bull. 536, 76 pp., illus.
1936.

Topography, native vegetation, and soil characteristics are among the points covered. The lack of proper agricultural practices in sections of the Great Plains is summarized.

- SEVERANCE, GEORGE. (3919)
METHODS OF TILLAGE FOR DRY FARMING. Wash. Agr. Expt. Sta. Pop. Bull. 15,
7 pp., illus. 1909.

"The control of the moisture supply is one of the most vital problems . . ." The author advocates keeping up the supply of chopped straw and stubble humus for maintaining spongelike soil conditions; loosening surface soil at the beginning of rainy seasons thus keeping a soil mulch of loose, dry, and moderately fine earth on field surfaces during the growing season. Types of field implements are discussed.

- SHARP, J. A. (3920)
EROSION CAN BE STOPPED, EVEN ON A HILLSIDE FIELD. Farmer-Stockman 50:
161, illus. March 15, 1937.

An Arkansas farmer tells of his experience in controlling the kind of soil erosion in which ditches get started through open fields. Proper plowing is suggested.

- SHEDD, C. K., COLLINS, E. V., AND DAVIDSON, J. B. (3921)
THE BASIN METHOD OF PLANTING ROW CROPS AND A BASIN LISTER PLANTER.
Agr. Engin. 16: 133-136, illus. April 1935.

The basin method of planting, developed in Iowa in 1933, is described and its utility discussed in detail. Tables and charts on the basin lister are given.

- SJOGREN, O. W. (3922)
DEVELOPMENT OF OFFSET DISK HARROWS. Agr. Engin. 17: 503-505, illus.
December 1936.

The author states that, among other uses, the offset disk harrow works in all types of soil and handles cover crops satisfactorily. Paper was presented before the power and machinery division at the annual meeting of the American Society of Agricultural Engineers, at Estes Park, Colo., June 1936.

- SMITH, R. S. (3923)
EXPERIMENTS WITH SUBSOILING, DEEP TILLING, AND SUBSOIL DYNAMITING. Ill.
Agr. Expt. Sta. Bull. 258, pp. 154-170, illus. 1925.

The author states that deep plowing and subsoil experiments indicate "that these tillage methods cannot be expected materially to increase crop yields," and quotes other experiment stations which also have not found these methods superior to ordinary or medium-deep plowing.

- SNYDER, W. P., AND OSBORN, W. M. (3924)
ROTATIONS AND TILLAGE METHODS IN WESTERN NEBRASKA. Nebr. Agr. Expt. Sta. Bull. 155, 48 pp. 1916.

The data presented in this bulletin should be considered as a means of comparing one method of tillage, rotation, or crop with another, rather than as a basis for determining the average crop production in this region. "The results of this work to date commend the common tillage practices of the farmers throughout this region in so far as these practices are conducted in a thorough and intelligent matter." Tables show average annual production and profit or loss from different rotations, systems of cropping, and methods of tillage for 8 years. Grain yields and precipitation records are also presented in tabular form.

- SOUTH DAKOTA AGRICULTURAL EXPERIMENT STATION. (3925)
SUBSOILING. S. Dak. Agr. Expt. Sta. Bull. 54, 24 pp. 1897.

This bulletin contains brief articles on Subsoiling for Garden Crops, by N. E. Hansen; Subsoiling, by E. C. Chilcott; Subsoiling for Farm Crops, by E. A. Burnett, and Reports on Subsoiling. Letters from farmers on personal experiences are presented.

- STURTEVANT, E. L. (3926)
EFFECT OF TILLAGE UPON THE RATE OF EVAPORATION. N. Y. Agr. Expt. Sta. Bull. 5, ser. 1, 2 pp. 1882.

"The question of drouth is one which periodically engages attention, and any means by which its injurious effect may be mitigated should certainly be known to the farmer. That cultivation, by forming a loose soil upon the surface which acts as a mulch, conserves the water to the soil is a fact which is well established . . ." The author cites various experiments.

- THOM, C. C. (3927)
TILLAGE IN ITS RELATION TO SOIL MOISTURE. Wash. Agr. Expt. Sta. Pop. Bull. 22, 4 pp. 1909.

Breaking up the stubble after harvest is regarded by the writer as an important factor in catching winter rains. "Retain it by an equally thorough system of early spring and succeeding summer cultivation."

- UNITED STATES BUREAU OF CHEMISTRY AND SOILS. (3928)
DESCRIPTION OF DAVIS SOIL-SAVING CULTIVATOR. U. S. Bur. Chem. and Soils Ann. Rept. 1931: 45-46. 1931.

"This machine, which has attracted much attention, can be used both as a cultivator for row crops and as a surface-tillage implement for fallow."

- UNITED STATES SOIL CONSERVATION SERVICE. (3929)
DAMMING LISTER PROVES USEFUL. Soil Conserv. 1: 3. March 1936.

Describes mechanical device developed by C. T. Peacock to conserve moisture and soil. It is used in Lincoln County, Colo.

- WANSER, H. M. (3930)
TILLAGE AND SOIL MOISTURE PROBLEMS. Wash. Agr. Expt. Sta. (Ann. Rept. 39) Bull. 237: 47. 1929.

Experiments reported are a continuation of work reported in 1927-28. The author says: "Previous investigations during seasons of light rainfall have led to the conclusion that a soil with a mulch on it over winter usually conserves less moisture than an unmulched soil . . . The results of the last two winters show the mulch retards "run-off" but whether it acts as an aid in conserving moisture or not depends on the character of the winters' precipitation."

- AND INGHAM, I. M. (3931)
SOIL STUDIES AT THE ADAMS SUBSTATION. Wash. Agr. Expt. Sta. Bull. 208: 46-48. 1926.

"The outstanding results were, that early spring plowing, which is the most common method of tillage, resulted in the second highest percentage of moisture in the soil at the beginning of the crop year. Fall disking, followed by early spring plowing, produced a slightly higher moisture content. The percentage of nitrogen in grain tended to decrease as the plowing was delayed. The same tendency was noticeable from shallow to deep plowing."—Expt. Sta. Rec. 56: 509. 1927.

- WEIR, W. W. (3932)
 HILLSIDE SOIL CONSERVATION. Pacific Rural Press 131: 350-351. March 14, 1936.

Discusses over-irrigation practices resulting in all-year erosion in some California orchards and the methods used by Soil Conservation Service to control the condition. Also describes the bench terrace type of cultivation developed in steep hillside orange and avocado groves of southern California which facilitates irrigation and at the same time effectively controls erosion.

- WHITE, J. H. (3933)
 THOUSANDS JOURNEY TO PEACOCK FARM. PLAINSMEN FROM FOUR STATES SEE NEW MACHINES AND DEEP WELL IRRIGATION. West. Farm Life 38: 6, 15, illus. September 1, 1936.

Relates effective work done by the damming lister invented by Charles T. Peacock, of Lincoln County, Colo. "It is not uncommon for this farmer to list and pocket-dam his summer-fallow three times before planting . . . As a result of these operations, after each rain Peacock's fields are literally filled with thousands of small ponds that hold water until it gradually soaks into the ground."

CONTOUR CULTIVATION

- ANONYMOUS. (3934)
 FARMS ON THE CONTOUR. Farmer 55: 3, illus. April 24, 1937.

Strip cropping has made hillside land productive in parts of Waseca County, Minn. Hillside corn yields are found almost equal to those of the lowlands.

- (3935)
 FIVE INCH RAIN COULDN'T GET AWAY. Kans. Farmer 74: 29. March 13, 1937.

A Greeley County, Kans., farmer reports successful experience with contoured land. With the five-shovel or more commonly known Peacock machine, he seeded 450 acres of wheat on the contour and found this wheat to be the best of his crop. Besides conserving moisture he believes that contouring has solved his wind-erosion problem, for his land showed no tendency to even sift throughout the summer and fall.

- BALLANTYNE, J. A. (3936)
 CONTOUR PLANTING OF FRUIT TREES; A MEANS OF PREVENTING SERIOUS SOIL EROSION. Agr. Gaz. N. S. Wales 47: 696-700, December 1936; 48: 31-34, illus. January 1937.

- BREGGER, J. T. (3937)
 CONTROLLING SOIL EROSION AND WATER RUN-OFF IN THE PENNSYLVANIA ORCHARD. Pa. State Hort. Assoc. Proc. 78: 44-51. 1937.

"The terrace is probably the outstanding example of mechanical erosion control. As soon as the benefits of contour planting become better known—both the economy in the use of horse or tractor power, and the greater conservation of soil, water and fertility—there should be a decided change in the direction of contour planting." Demonstrations on the Waynesboro, Pa., project are cited.

- BREMER, M. (3938)
 NOTES ON SOIL EROSION. Trop. Agr. [Ceylon] 69: 30-32. July 1927.
 Systematic contour planting is urged. Methods for starting such a system are described.

- CLARK, M. W., AND TASCHER, W. R. (3939)
 CONSERVING SOIL BY CONTOUR FARMING. Mo. Agr. Col. Ext. Cir. 365, 14 pp., illus. 1937.

"Contour farming may be practiced to advantage on either terraced or untterraced fields. It is an effective soil and water-conservation measure on sloping fields, especially those with deep surface soils and permeable subsoils. Crop rotations which include legumes and grasses, combined with contouring have proven effective in reducing erosion losses."

CRAIG, D. B.

(3940)

CONTOUR PLANTING AND IRRIGATION OF ORCHARDS TO CONTROL EROSION. Utah Farmer 57: 3. March 10, 1937.

"In the distribution of water to a contour planted orchard it is necessary to have water under control at all times. For this reason, pipes or flumes are usually employed. Pipe irrigation systems are more desirable since they are buried in the ground and do not hinder cultivation operations . . . Advantages of pipe line and contour irrigation furrow system are as follows: (1) Duty of water is greater due to control of flow and avoidance of waste. (2) Seepage losses are reduced to a minimum. (3) Water can be run under pressure across low spots and ridges. (4) Expense of cleaning and maintaining open ditches is eliminated. (5) Pipe line does not interfere with cultivation operations. (6) Erosion of top-soil is minimized by absolute control of amount of flow delivered to each furrow. (7) Soil fertility losses due to excessive deep percolation are reduced. (8) More uniform wetting all of ground, insuring better tree growth and larger crops."

HODGKIN, CARLYLE.

(3941)

UP AND DOWN, OR AROUND? CONTOUR FARMING KEEPS THE WATER ON THE LAND. Nebr. Farmer 78: 3, 24, 27, illus. May 9, 1936.

The author describes results of experimental demonstrations in contour farming and terracing as carried out in region 7 (Kansas and Oklahoma). "Our way of treating Mother Earth is beginning to change. We are beginning to cultivate her hillsides horizontally instead of vertically. Rows up and down are going out; rows around and around are coming in. And the big idea is to keep the bottom of each row level so the rain will be caught where it falls and there will be no wash."

HOWARD, I. M.

(3942)

CONTOURING MULTIPLIES YIELD. Prog. Farmer (Tex. Ed.) 51: 27, illus. November 1936.

Oklahoma farmer tells how his yields increased 35 percent over a 5-year period by the use of terraces and "crooked rows." Ten-year studies of the value of terraces and contour farming at the Oklahoma Panhandle Experiment Station substantiate this claim. There in 1935 tepary beans planted on the contour on terraced land of 1-percent slope produced 542 pounds of hay per acre in comparison with a 196-pound yield on unterraced land. This was attributed to the fact that terraces double the depth of penetration. Cost of terracing High Plains land is about 77 cents an acre according to figures from the soil conservation project near Dalhart, Tex. Estimates of increased value of cultivating on the contour vary from 30 to 50 cents an acre.

(3943)

STORED RAINDROPS A YARDSTICK OF YIELDS. Farmer-Stockman 50: 6, 28. March 1, 1937.

Personal experiences of western Oklahoma farmers are cited to show the advantages of contour farming. It is pointed out that there is a difference of opinion among the farmers as to the value of contoured rows in controlling wind erosion. "Some argue that since with crooked rows parts of the rows are parallel with the path of prevailing winds, such parts suffer severe wind erosion. Others say that the moisture held by contour farming reduces blowing to a minimum even on the sections of rows parallel with the path of prevailing winds. Regardless of who is right, contour farming will continue as a permanent practice in the community because it holds the yardstick by which yields are measured—moisture."

JOHNSON, E. C.

(3944)

CONTOUR FARMING IN KANSAS. Kans. Farmer 51: 7, illus. July 19, 1913.

Machinery and methods used for contour farming to prevent soil washing are described. "Contour farming could undoubtedly be utilized profitably in this State to a much greater extent than at present . . ."

LAKIN, H. D.

(3945)

PROFITING FROM GOING CROOKED. Mich. Farmer 187: 5, 19, illus. June 19, 1937.

On a new method of setting orchards in Michigan. In an effort to curb erosion on their valuable fruit soils, fruit growers in Berrien County, Mich., have begun to set their peach orchards on the contour in order to save soil, humus, fertility, and moisture for the crop.

LONGSDORF, L. L.

(3946)

WE CAN STOP SOIL WASHING. Kans. Farmer 72: 22. June 5, 1934.

"Contour cropping, with rows of close-drilled crops and row-crops planted on the level, is doing much to control soil erosion and conserve rainfall . . ."

MONTGOMERY, G. A.

(3947)

FARMING ON THE LEVEL. Capper's Farmer 47: 14. September 1936.

Success with contour cultivation practiced on the farm of D. J. Rundell, Norton County, Kans., since 1906 is described. "A visitor to the Rundell farm borrowed a posthole digger and went out to determine how effective contouring had been in saving top soil. On one of the steepest slopes he dug down about 10 inches. The top 9 inches was rich black loam. Leaving the Rundell farm, he drove about the neighborhood. On many farms the loam top soil was all gone from whole fields, and only the yellowish subsoil was left."

MULLEN, C. W.

(3948)

CROOKED ROWS SAVE MOISTURE. Farmer-Stockman 49: 5, illus. February 15, 1936.

A description of terrace construction in Dewey County, Okla. The experience of a farmer with contour terraces and heavy rainfall is discussed, as well as the reclamation of gullies by this method.

UNITED STATES SOIL CONSERVATION SERVICE.

(3949)

CONTOUR STRIPS COST LESS TO OPERATE. Soil Conserv. News Letter (Neshanic Watershed ed.) 11 (12): 4. May 15, 1937. [Mimeographed.]

Figures kept by a farmer in Avoca, N. Y., show that it cost 48 cents less per acre to plow his contour strips than his square field.

VON TREBRA, R. L.

(3950)

LABOR ADVANTAGES OF CONTOUR LISTING. Soil Conserv. 1: 5. October 1935.

Explains the advantages of working rough land on the level.

WASHBURN, H. L.

(3951)

EROSION IS A GREAT SOIL WASTER. Pacific Rural Press 126: 359, illus. November 4, 1933.

On the value of contour farming and a warning as to measurement. "Two men, a hand level and a 10 foot stick . . . can lay the contours off almost as fast as a team can plow." Cover crops, contour strip cropping, tile drainage, and terracing are all advocated to control washing.

STRIP CROPPING

ANONYMOUS.

(3952)

STRIP CROPPING SAVES WIND DAMAGE. Farm and Ranch 53: 14. July 15, 1934.

Research work has indicated the importance of strip farming in the Southwest.

(3953)

STRIP CROPS GO WITH CONTOURED ROWS. Farmer-Stockman 49: 5, 11, illus. April 15, 1936.

The results of strip-cropping experiments, carried on at the Guthrie soil erosion station in Logan County, Okla., with cotton, alfalfa, oats, and Sudan grass are described.

(3954)

STRIP FARMING HAS LIMITATIONS. (Editorial.) Mont. Farmer 23: 4. May 1, 1936.

Discusses tree planting and sod stripping to supplement strip farming in areas where soil is susceptible to drifting. Not examined.

- ANDERSON, C. L. (3955)
 TYPES OF STRIP FARMING USED IN MONTANA. *Dakota Zephyr* 2: 23-24, illus. March-April 1936.
 "For the control of wind erosion, a new term, 'strip farming' . . . is used to designate straight parallel strips laid out crosswise to the prevailing wind direction." Other types of strip farming are also explained in text and by illustrations.
- BARRON, ASA. (3956)
 STRIP CROPS PROTECT SOIL. *Capper's Farmer* 47: 25. June 1936.
 Describes strip-cropping method for summer fallow in Platte County, Wyo., in which strips of fallow are alternated with strips of wheat in a cross direction with prevailing winds.
- BEELER, M. N. (3957)
 CRAZY QUILT CROPPING. *Capper's Farmer* 48: 7, 55, illus. April 1937.
 Strip cropping as practiced by farmers near La Crosse, Wis., is described, giving the sequence of crops used in planting across slopes in a 2-year schedule.
- BENNETT, H. H. (3958)
 EROSION CONTROL BY STRIP CROPPING SAVES LAND. *Tobacco Grower* 2: 7, 9, illus. October 1933.
 Reviews the findings of strip-cropping experiments conducted at various agricultural experiment stations and recommends the use of lespedeza, alfalfa, cowpeas, and sorghum.
- BUTLER, EUGENE. (3959)
 STRIP CROPS GROW IN FAVOR. *Prog. Farmer (Tex. Ed.)* 52: 30. February 1937.
 Reports from blackland farmers indicate that better cotton yields are obtained and that they make more money by practicing strip cropping.
- CARNES, EARNEST (3960)
 STRIP-CROPPING AND ITS RELATION TO FARM TERRACING. *The Land, Today and Tomorrow*. 1: 9-10. October 1934.
 This article suggests a method of survey to be followed by the farmer in planning his strip-cropping program. Data on the nature of terraces are also presented.
- CARRIER, LYMAN, AND KELL, WALTER V. (3961)
 STRIP CROPPING. U. S. Soil Conserv. Serv. SCS-TP-2, 9 pp., illus. May 1935. [Mimeographed.]
 This article describes the advantages and disadvantages of strip cropping and a modified form of strip cropping designated as "field stripping" in erosion control. Rotation of strip crops, tillage, and cover crops is discussed, and particular attention is given to width of strips.
- CHILDERS, L. E. (3962)
 BALK STRIPS CHECK SPRING EROSION. *Farmer-Stockman* 49: 19, illus. December 15, 1936.
 Describes a unique system of strip cropping, in use at the Tyler soil erosion station in east Texas, known as the Tyler BWS or balk water-furrow strip-crop system.
- CHINN, R. H. (3963)
 CONTOUR AND STRIP FARMING. *Purdue Agr.* 31: 78, 87. March 1937.
 "One of the most practical means of checking soil erosion is to practice contour and strip cropping. Such a practice prevents the damaging run-off of water during the rainy season and holds this water so that crops may utilize it during rainy periods." Data are given on the relation of the width of the strips to the kinds of crops used, and to topography. Terracing in connection with strip cropping is also discussed.
- DIETER, E. B. (3964)
 THE ROLE OF STRIP-CROPPING IN EROSION CONTROL IN THE BLACKLANDS OF TEXAS. *Amer. Soil Survey Assoc. Bull.* 17: 163-164. 1936.
 "The erosion problem of the region is intensified by the rather unusual physical properties of the Houston soils." Experiments with oats and cotton

strip cropping at the Temple, Tex., experiment station, are described and results given. "A system of strip-cropping will usually afford an excellent degree of protection until it is found possible to terrace the land."

DEKKER, JACOB.

(3965)

STRIP FARMING AS A WAY TO STOP WIND EROSION. The Furrow [Canada] 41: 3, 12, illus. September-October 1936.

The writer, a farmer in Alberta, Canada, describes the benefits of strip farming for the rebuilding of soil productivity and tells how this should be done. "The Alberta government recently passed legislation to the effect that soil drift control is now compulsory in Alberta and strip farming is advocated as an effective measure."

FULLER, GUY C.

(3966)

FOLLOWING PARALLEL PATHWAYS TO EROSION CONTROL. Soil Conserv. 2: 21-22, illus. August 1936.

Strip cropping is one of the most efficient and practical means of controlling erosion. "It is simple, flexible, economical, and widely applicable."

(3967)

LONG EXPERIENCE WITH STRIP CROPPING CITED BY FARMERS. Soil Conserv. 2: 68-71, illus. October 1936.

The author gives a detailed account of his visits to a number of farmers in southwestern Pennsylvania and southeastern Ohio and sets forth the information he gathered on strip cropping.

GEIB, H. V.

(3968)

STRIP CROPPING TO PREVENT EROSION. U. S. Dept. Agr. Leaflet 85, 6 pp., illus. 1931.

"Practical information is given on strip cropping for erosion prevention. This practice consists of planting strips of densely growing or fibrous rooted crops between strips of clean tilled crops along the contours of erosive slopes. It has been found that strip crops preserve terrace lines previously surveyed until it is possible to construct the terraces. They also reduce run-off and erosion and increase the penetration of rain water into the soil. Under certain conditions, especially where the land is gently sloping or where the rainfall is light, strip cropping may be substituted for terracing."—Expt. Sta. Rec. 66: 875. 1932.

—, AND HILL, H. O.

(3969)

STRIP CROPPING TO PREVENT EROSION. Farm and Ranch 51: 24, illus. April 1, 1932.

Advises that terracing be combined with strip cropping in erosion control. Gives directions for planting and suggests crops suitable for strips.

GROVES, ELDEN R.

(3970)

LEVEL FARMING ON THE HILLSIDE. Farm and Dairy 24: 1, 5, 13, illus. September 3, 1937.

On strip cropping and contour farming in eastern Ohio. The work of the Soil Conservation Service and the Civilian Conservation Corp is described. Benefits gained by individual farmers as a result of scientific erosion control are discussed.

HAFENRICHTER, A. L., AND ROCKIE, W. A.

(3971)

STUDY OF SPECIES, VARIETIES, AND STRAINS OF PERENNIAL GRASSES AND LEGUMES FOR EROSION CONTROL. Wash. Agr. Expt. Sta. Bull. 291: 60. 1934.

Reports the progress of studies conducted at the agricultural experiment station at Pullman, Wash., to obtain data on the comparative ability of perennial grasses, sweetclover strains, and alfalfa varieties to control erosion and maintain stands on clay hilltops and steep slopes.

HALE, G. A.

(3972)

STOP SOIL STRIPPING BY STRIP CROPPING. Prog. Farmer (Ky.-Tenn. Ed.) 52: 20, illus. February 1937.

Instructions are given on planting and terracing.

HENDRICKSON, B. H.

(3973)

STRIP CROPPING FOR SANDY LOAMS OF REGION 4. U. S. Soil Conserv. Serv., SCS-TP-9, 5 pp. May 1, 1936. [Mimeographed.]

"Several forms of strip cropping are used in Region 4. The methods are mainly based upon the use of contoured dense-cropping types upon erodible cropland slopes in such a manner that the soil-trap and run-off spreading effects of resistant cropping strips may be used to obtain erosion protection. Resistant crops are also used to reduce channel scour, and for protection of terrace ridges." Various strip-cropping practices and the 2-year resistant strip rotation at the experiment station at Tyler, Tex., are described.

HOWARD, I. M.

(3974)

STRIP-CROPPING SAVES SOIL. Farm and Ranch 55: 26, illus. May 1, 1936.

Strip cropping without terracing on gently sloping land in Payne County, Okla., with diversion ditches where needed, proves successful in checking soil losses and conserving moisture. "No more time is required for tilling the cultivated crops in strips than in straight rows . . ."

KELL, WALTER V., and BROWN, GROVER F.

(3975)

STRIP CROPPING FOR SOIL CONSERVATION. U. S. Dept. Agr. Farmers' Bull. 1776, 37 pp., illus. 1937.

This bulletin presents the results of studies on three methods of strip cropping on steep slopes—contour, field, and wind strip cropping. The economies and advantages are cited, together with instructions as to procedure.

MULLEN, C. W.

(3976)

STRIP CROPS SAVE SOIL LOSSES. Farmer-Stockman 48: 5-21, illus. March 1, 1935.

Strip farming and contoured rows are recommended for land that has not been terraced. A strip-farming experiment in Texas is cited: "Strips have proved their value over the years . . . Where strips of oats were planted on contours, the tendency to gully was largely dissipated . . . Where there were no strips of alfalfa, the water loss was four times increased and the [soil] loss ten times increased . . ."

NEEL, L. R.

(3977)

HILLSIDE FARMING WITHOUT EROSION. South. Agr. 67: 6, illus. July 1937.

Through strip cropping the farm of L. A. Zimmerman, of Madison County, N. C., was "changed from a destructive to a constructive type of farming which improves the soil each year."

REED, W. H., AND OTHERS.

(3978)

CONTROL SOIL BLOWING BY STRIP FARMING. Great Northern Railroad Leaflet, 10 pp., illus. 1935.

Statements from several northwestern farmers on the efficacy of strip farming to control erosion are presented in this leaflet. Data on strip-farming methods are outlined.

STEWART, P. H.

(3979)

STRIP CROPPING YIELDS SAFETY. Capper's Farmer 47: 20, 37, illus. January 1936.

Native grasses as soil holders against wind and water erosion, and the best species for regrassing areas are discussed in connection with the cultivation and laying out of fields to reduce soil blowing. Practical examples of strip farming in Nebraska are cited.

TASCHER, W. R., AND CLARK, M. W.

(3980)

CONSERVING SOIL BY STRIP CROPPING. Mo. Agr. Col. Ext. Cir. 368, 8 pp., illus. 1937.

Strip cropping is a simple, economical, and effective soil conservation measure. The three general types of strip cropping are described—rotation strip cropping, field striping, and spreader or buffer striping. The procedure for each is given and illustrated by diagrams.

TOWNSEND, T. L. (3981)
ENGINEERING STRIP FARMING. *Nor'-west Farmer* 53: 7, 26, 27, illus. March 1934.

A discussion of strip farming as practiced in southern Alberta. Tells how Alfred D. Kettenback, a former American Army engineer, supervises farming practices for several Canadian farmers.

UNITED STATES EXTENSION SERVICE. (3982)
STRIP FARMING IN MONTANA COMBATS WIND EROSION. *U. S. Ext. Serv. Rev.* 7: 107, illus. July 1936.

A system of strip-farming and other soil erosion-control practices established to combat wind erosion throughout the summer-fallow area of Montana are discussed.

UNITED STATES SOIL CONSERVATION SERVICE. (3983)
SAYS STRIP FARMING USES LESS TRACTOR FUEL THAN OLD METHOD. *Soil Conserv. News Letter* 2: 3. November 1936.

When a New Jersey farmer was asked why he could cultivate his corn faster with less consumption of gasoline for his tractor, he replied that it was because he did not have to shift gears. He could run most of the time in high, thus saving both gas and time.

ZEASMAN, O. R. (3984)
STRIP CROPS AND TERRACES BEST WAYS TO REDUCE EROSION. *Wis. Agr. and Farmer* 64: 21. April 10, 1937.

Warns against depending on so-called erosion control crops for all the protection against water injury in spring or summer freshets. While not underestimating the effectiveness of crop cover in protecting soil against water erosion, the writer urges people to sense the limitations.

WILDLIFE MANAGEMENT AS RELATED TO SOIL CONSERVATION

ANONYMOUS. (3985)
BEAVERS AS CONSERVATORS. *Field* [London] 168: 664. September 19, 1936.

"The beaver of the Canadian woods used to be much abused for the damage it did to timber, not only for the trees it cut down, but even more for the number killed by having their roots flooded. Now it has been realized that these pools in the smaller tributaries are a great asset to a river in conserving the water in dry seasons."

— (3986)
BIRD PROTECTION IS CROP AID. *The Land, Today and Tomorrow* 1: 31. November 1934.

This article emphasizes the need of more bird life to control the ravages of insects and briefly describes the progress of the Soil Erosion Service in reestablishing forests on a portion of the land in the Duck Creek watershed near Lindale, Tex.

— (3987)
FEED QUAIL AND CHECK EROSION. *Tobacco Grower* 5: 4. January 1937.

— (3988)
GAME RESTORATION FOSTERED IN COMBATING SOIL EROSION. *Sci. News Letter* 27: 86. February 9, 1935.

Comments on remarks made by Ernest G. Holt, of the Soil Conservation Service, and F. A. Silcox, of the United States Forest Service, at the New York meeting of the American Game Conference.

— (3989)
MUDDY WATERS. (Editorial.) *Ala. Game and Fish News* 8: 6. September 1936.

Comment on the observation made by Ernest G. Holt that "thousands of fishing sites will provide less sport and yield fewer fish this year than ever before as a result of soil erosion."

ANONYMOUS.

(3990)

NEW PASTURE POND STOCKED WITH FISH. *Farm and Ranch* 55: 11. September 1, 1936.

"Surrounded by 57 acres of well-grassed pasture land that has been contour ridged as recommended by the Soil Conservation Service, the 2-acre pond is well protected from silting. Directly above it has been established a 3-acre filter basin consisting of alternate strips of closely planted buckbrush and grass." In addition to providing water for fish the pond will furnish water for livestock.

(3991)

PROGRAM OF NORTH AMERICAN WILDLIFE CONFERENCE. *Amer. Forests* 42: 138-139. March 1936.

Forest carrying capacity and management, check dams in arid regions, and stream improvement as related to erosion are among the topics discussed in this report of the North American Wildlife Conference at Washington, D. C., February 3-7, 1936.

(3992)

SOIL EROSION AND WILDLIFE. *Amer. Forests* 41: 507. September 1935.

The writer describes a program of stock reduction and erosion control designed to check the gullying of overgrazed lands and to conserve and spread the water so necessary to the Indian and his sheep.

(3993)

WILDLIFE ASPECTS OF THE RESETTLEMENT ADMINISTRATION LAND PROGRAM. *Wildlife Rev.* 4: 26-27. June 1936.

An outline of wildlife conservation projects of the Resettlement Administration, organized on a regional basis for improvement of game cover, increase of natural food supplies, game reconnaissance, predatory animal control, and improvement of ponds and streams.

(3994)

THE WILD LIFE FEDERATION. *Science* 85: 256-257. March 12, 1937.

At the St. Louis meeting of the American Wild Life Conference in March 1937 a permanent Wild Life Federation was formed.

(3995)

WILDLIFE MANAGEMENT BY FEDERAL AGENCIES. *Amer. Forests* 42: 122-123, 150-152, illus. March 1936.

The cooperative functions of the Federal agencies which are directly concerned with wildlife restoration and management are set forth.

(3996)

WILDLIFE PRESERVATION AND SOIL CONSERVATION COMBINED IN APPROVED AGRICULTURAL PRACTICES. E. I. Du Pont de Nemours & Co. *Agr. News Letter* 5: 13-14. January 1937.

The author discusses five inexpensive and widely applicable measures which conserve the soil and at the same time preserve wildlife. The tested measures include planting of mixed grain; soil-binding trees, shrubs, or cover crops; fencing of farm woodlands; brush piles left as cover for wildlife; and strips and borders of pine and spruce. "Wherever practical erosion-control workers interested in wildlife also discourage fence-row cleaning, so that vegetative growth along fence rows will be saved for wildlife shelter and food."

(3997)

WILDLIFE RESOURCES. *Science* 83: 458. May 15, 1936.

Explains cooperative plan of nine States with the United States Bureau of Biological Survey for investigations to learn how to increase, maintain, and use wildlife resources, and to show on trial areas how facts found in research can be applied in a practical manner.

AITKEN, W. W.

(3998)

THE RELATION OF SOIL EROSION TO STREAM IMPROVEMENT AND FISH LIFE. *Jour. Forestry* 34: 1059-1061. December 1936.

Gradual change in the stream environment in Iowa caused by erosion has brought about a corresponding change in the fish fauna. "Wise management

and conservation of Iowa soil will be a long step toward bringing about the return of the species of fish which originally flourished in the streams of Iowa."

BEAL, F. E. L.

(3999)

SOME COMMON BIRDS USEFUL TO THE FARMER. U. S. Dept. Agr. Farmers' Bull. 630, 28 pp., illus. 1915. (Revised, 1926.)

This bulletin discusses the habitat, food habits, and general relation to agriculture of more than 50 species of birds common to farming sections.

— and McATEE, W. L.

(4000)

FOOD OF SOME WELL-KNOWN BIRDS OF FOREST, FARM, AND GARDEN. U. S. Dept. Agr. Farmers' Bull. 506, 33 pp., illus. 1912. (Revised, 1922.)

"This bulletin discusses the food habits and relation to agriculture of 20 species of birds selected because of their economic importance to farmers and growers."

— McATEE, W. L., and KALMBACH, E. R.

(4001)

COMMON BIRDS OF SOUTHEASTERN UNITED STATES IN RELATION TO AGRICULTURE. U. S. Dept. Agr. Farmers' Bull. 755, 43 pp., illus. 1927.

"From a purely practical point of view the most important of the relations of native birds to man are the economic." This bulletin is designed to show their relation to insect and other enemies of crops. "The useful kinds far outnumber the injurious, however, and so great is their value as insect destroyers in the United States that to them may be given the credit of being one of the greatest controlling factors in limiting the development of insect pests and in preventing many disastrous outbreaks." The food habits of 23 species of birds in the Southwestern States are discussed.

BENNETT, H. H.

(4002)

THE SOIL EROSION SERVICE—A NEW BUT MAJOR FORCE IN THE FIELD OF CONSERVATION. Soil Conserv. Serv. 7 pp. 1935. [Mimeographed.]

An address presented before the thirteenth annual convention of the Izaak Walton League of America, Inc., Chicago, Ill., April 12, 1935. Discusses the inception of its program which "is essentially one of better land use." The methods employed are stated as running the gamut of agronomy, biology, engineering, forestry, and geology, but the basic idea underlying all is the restoration of vegetative cover. The relation of the program to wildlife conservation is given consideration.

(4003)

WILDLIFE AND EROSION CONTROL. Birdlore 38: 115-121. March-April 1936.

Sets forth the three objectives of the Soil Conservation Service wildlife program as follows: (1) The avoidance, insofar as possible, of acts detrimental to wildlife; (2) the betterment of conditions for wildlife; (3) the development of an annual self-perpetuating crop of game, fur bearers, and game and fish to provide supplemental compensation to the farmer for lands retired from agricultural use in the interest of erosion control.

BUMP, GARDINER.

(4004)

WANTED, MORE DESIRABLE WOODLANDS. Outdoor Amer. 1: 4-5, 11, illus. December 1935.

Discusses food and cover requirements of woodland game birds and animals and suggests strip slashing through woods, with thick brushy growth, for shelter and staple food provision for such game as ruffed grouse, gray squirrels, hares, and small deer.

CHAPMAN, H. C.

(4005)

FORESTRY AND GAME MANAGEMENT. Jour. Forestry 34: 104-106. February 1936.

A discussion of coordination in the specific management of forests.

CLAYTON, C. F.

(4006)

LAND-USE PLANNING AND THE GAME CROP. Amer. Game Conf. Trans. 20: 97-110. 1934.

The author discusses the correlation of Federal, State, and community planning for regulation of land to conform to its physical and economic characteristics. Drainage of marshes, with destruction of breeding grounds of waterfowl, deforestation, and pollution of lakes and streams are among

the factors serving indirectly to jeopardize the survival of the useful species of wildlife. The author stresses the fact that all aspects of the national recovery program are interrelated.

CONNERY, R. H. (4007)

GOVERNMENTAL PROBLEMS IN WILD LIFE CONSERVATION. 250 pp. New York, Columbia Univ. Press; London, P. S. King & Son, Ltd. 1935.

Studies in history, economics, and public law; edited by the faculty of political science of Columbia University.

Bibliography, pages 233-246.

CORNELL UNIVERSITY ARBORETUM. (4008)

A MAJOR PROJECT IN FINGER LAKES REGION UNDER ECW PROGRAM. Parks and Recreation 19: 286-289, illus. April 1936.

Plans and policies of the arboretum, construction of which began in the summer of 1935, are presented. In the completed arboretum the United States Department of Agriculture will maintain soil-erosion experimental plots, and the New York State Conservation Commission plans to improve fishing in the Cascadilla Creek.

CROUCH, W. E. (4009)

POCKET-GOPHER CONTROL. U. S. Dept. Agr. Farmers' Bull. 1709, 20 pp., illus. 1933.

One of the reasons for gopher control is that their burrows interfere with the proper distribution of water used in irrigation and contribute to soil erosion. Methods of control described are poisoning, trapping, flooding, fumigation, shooting, and viruses.

DACHNOWSKI-STOKES, A. P. (4010)

PEAT LAND FOR WILDLIFE. Amer. Wildlife 26: 55, 62-63, illus. July-August 1937.

"Under conditions of heavy or prolonged rainfall, the absorbing and retaining capacity of an area of peat plays an important part in the storage and control of water and in mitigating severe and destructive floods, erosion and silting. The basic principle on which water conservation operates in peat land reveals also the role which a vegetable cover plays not only in providing cover, shelter, and food for wildlife, but also in aiding absorption and infiltration of water, retarding run-off and developing natural reservoirs of impounded water."

References cited, page 63.

DARLING, J. N. (4011)

CONSERVING OUR WILD LIFE. Recreation 28: 469-471. January 1935.

Prescribes a program of wildlife management that includes the restoration of suitable environment, erosion control, and soil and forest conservation.

WILDLIFE CRISIS. Amer. Forestry 42: 101-103, illus. March 1936. (4012)

"We have awakened too late to the needs of so-called conservation . . . If wildlife is an economic and social benefit our first objective must be restoration. We need a national program of restoration and conservation which shall be adopted as a policy of our national government."

SHELDON, H. P., AND GABRIELSON, IRA, N. (4013)

GAME MANAGEMENT OF THE FARM. U. S. Dept. Agr. Farmers' Bull 1759, 22 pp., illus. 1936.

"Game management is to farming what planned utilization of by products is to the manufacturing industry . . . A goodly supply of game birds, in addition to being beneficial because of their insect-consuming habits, will eventually provide the farmer either extra food and pleasure or an added source of income . . . Game management can be undertaken independently by individual farmers, but the best results come from cooperation with neighbors." A description also is given of a plan that has proved successful in Iowa for cooperative game management.

- DAVIS, KENNETH. (4014)
PROTECTING FUR, FUR, AND FEATHER IN COON VALLEY. Soil Conserv. 2: 109-113, illus. December 1936.
Plans for permanent wildlife conservation in the oldest erosion-control demonstration area—Coon Valley, Wis.
- DAVISON, V. E. (4015)
HANDBOOK OF WILDLIFE MANAGEMENT REGION 9. U. S. Soil Conserv. Serv. SCS-RB-7, 31 pp., illus. 1937. [Mimeographed.]
Contents: Function of the section of Wildlife Management; wildlife management in region 9; management of existing woodlands; woody plantings for wildlife; herbaceous wildlife plantings; utilization of other cover for wildlife; water developments; special wildlife-management activities; wildlife population studies; woody species available for erosion-control planting in region 9.
- DAY, A. M. (4016)
SOIL EROSION IS OFTEN CAUSED BY BURROWING RODENTS. U. S. Dept. Agr. Yearbook 1931: 481-484, illus. 1931.
A short discussion of rodents on western ranges, and the damage done by them to irrigation works.
- DENGLER, H. W. (4017)
WILDLIFE IN AN EROSION CONTROL PROGRAM. Md. Conserv. 14 (1): 10, 23. Winter Issue, 1937.
In conjunction with woodland management work at Harwood, Md., the Department of Agriculture has been working on the improvement of wildlife conditions. The education of cooperating farmers to the social and biological importance of wildlife on their farms and avoidance of factors detrimental to wildlife were two of the chief points of the program.
- DIEFFENBACH, R. (4018)
WATERFOWL RESTORATION PROGRAM UNDERTAKEN BY THE GOVERNMENT. U. S. Dept. Agr. Yearbook 1935: 330-331. 1935.
The program for study of wildlife problems with particular emphasis on measures to rehabilitate the rapidly vanishing waterfowl population is outlined. "For the most part the improvement will be the removal of drainage devices previously installed and the construction of dikes, dams, and water-control works, to impound and stabilize the waters that normally flow into these areas."
- ELLIS, M. M. (4019)
POLLUTION AND AQUATIC LIFE. Amer. Wildlife 26: 38, 45-46, illus. May-June 1937.
Presented at the second North American Wildlife Conference, St. Louis, Mo., March 4, 1937. Erosion is recognized as the major cause of the silt problem in inland waters.
- ERRINGTON, P. L. (4020)
IOWA EXPERIMENTS WITH QUAIL. Outdoor Amer. 1: 4-5, 16. May 1936.
The restoration of bobwhite quail as dependent upon farmer, sportsman, and soil-erosion-control agencies is discussed. "Erosion control may be closely linked with quail management, or vice-versa, and this combination stands far above everything else in promise. The sociological and economic necessity for wise land use, of which the control of soil erosion is an essential part, may indirectly prove to be the salvation of the bobwhite and other wild creatures having similar living requirements . . ."
- FINLEY, W. L. (4021)
THE BEAVER, FOREMOST WILDLIFE CITIZEN. La. Conserv. Rev. 6: 12-13, 26, illus. January 1937.
"The proof today is clear that a beaver's value is in his work and not solely in his hide." Examples of the loss of water, following the trappers' campaign against the beaver in Louisiana, are given. Conservation of the beaver is considered a necessity.
- FRANKLIN, SIDNEY. (4022)
THE PLACE OF WILDLIFE CONSERVATION IN A SOIL CONSERVATION PROGRAM. Conservationist, 1: 5-7, illus. April 1936.

GABRIELSON, I. N.

(4023)

THE CORRELATION OF FORESTRY AND WILDLIFE MANAGEMENT. Jour. Forestry 34: 98-103. February 1936.

Modifications of policies already in effect for wildlife management as correlated with the national forestry plan are suggested. These are: (1) Yearly uniform distribution of cutting operations; (2) reconsideration of planting programs; (3) redefine timber-stand improvement concept in order to prevent damage to wildlife values; (4) give the land management agency a voice in management of game on lands under its administration; (5) careful scrutiny of all plans to determine whether needed and economically feasible; and, (6) study game refuges in the light of existing and new knowledge.

(4024)

FLOODS AND WILDLIFE. Sci. Amer. 156: 100-102, illus. February 1937.

States that flood-control programs hold a vital interest for those concerned with the increase of wildlife resources and proposes plans whereby these programs may be especially helpful to wildlife conservation.

(4025)

A NATIONAL PROGRAM FOR WILDLIFE RESTORATION. Amer. Forests 42: 104-105, 126, 145, illus. March 1936.

Presents the essentials of a national wildlife program. Briefly stated, these essentials are: land for proper wildlife environment; cooperation between States and Federal government; recognition by public land planners and private landowners of the importance of wildlife restoration and conservation; a cessation of water pollution which destroys the animal food of waterfowl; research on all phases of wildlife; closer coordination of its land activities by the Federal Government, and basic protective legislation for wildlife protection.

GORDON, G. B.

(4026)

FORESTS, LAND AND WATER. Jour. Forestry 33: 896-899. November 1935.

Lands and water of Maine, some fundamental angles of forest management, and the relation between game and land values are pointed out. "The State of Maine must eventually modernize its laws in regard to the management of fish and game resources."

GORDON, SETH.

(4027)

CONSERVATION MADNESS. Country Gent. 107: 16-17, 91-92, illus. May 1937.

"Mere protection, and more and more restocking where not needed, will never assure a proper abundance of wild life. Without a favorable habitat, proper food and cover, and the application of sensible management, we shall never attain our common goal of a well-rounded conservation program."

GRANGE, WALLACE B., and McATEE, W. L.

(4028)

IMPROVING THE FARM ENVIRONMENT FOR WILD LIFE. U. S. Dept. Agr. Farmers' Bull. 1719, 61 pp., illus. 1934.

Wherever an increase in the abundance of farm wildlife is desired, the practices recommended in this bulletin will be useful. The authors discuss cover for wildlife, cover management, farm wood lots, windbreaks and thickets, cover in relation to pests, insects, marsh and water areas, cultivated crops, food supply, and the protection of wildlife against predatory animals. Information is given on making a farm-game survey, and the possibility of financial returns from game management is considered.

GRINNELL, J.

(4029)

WHY WE NEED WILD BIRDS AND MAMMALS. Sci. Monthly 41: 553-556. December 1935. [Condensed in Conservation 2: 7, illus. June 1936.]

"The relationships which have been set up through the ages between birds, mammals, and plants cannot be disturbed without serious consequences." From observations made the author is convinced that certain birds and mammals constitute an important agency in the disposal of oaks and many other trees and shrubs.

GROSS, M. R.

(4030)

RODENTS REQUIRE CONTROL. Soil Conserv. Digest 2 (10): 8-10. July 1936.
[Mimeographed.]

Describes damage to terraces, structures, and plantings used in erosion control, by gophers, squirrels, rabbits, wood rats, and field mice and gives approved methods to control these animals.

HERSHEY, J. W.

(4031)

BALANCING A WILDLIFE PROGRAM. SOME PLANTS BENEFIT BOTH WILD AND FARM ANIMALS. Amer. Wildlife 25: 71, 78, illus. September-October 1936.

"In reestablishing game . . . it would be well to consider . . . planting and building up a series of crop trees covering a twelve-months' feeding." This would do much toward solving the feeding problem of all wildlife. Accompanying the article is a chart of bushes and trees for wildlife conservation.

HOLT, E. G.

(4032)

EROSION CONTROL AND GAME DEVELOPMENT. Amer. Game Conf. Trans. [New York] 20: 177-181. 1934.

One of the first erosion control projects of the Soil Conservation Service was the drainage basin of Coon Creek, near LaCrosse, Wis. This is known as the upper Mississippi Valley demonstration area. It is with this project that the author is concerned, and he states that "the details that follow apply here, though the broader principles are equally applicable to our whole field of operations." Overgrazing causes erosion, therefore livestock must be kept out of woodland and off slopes and these made to yield both wood products and game. Thus erosion control and proper land utilization go hand in hand. Opportunities in the management of quail and marketable surplus are seen, and the cooperation of farmers in the development of wildlife is stressed.

(4033)

INTEGRATING FORESTRY AND GAME MANAGEMENT IN EROSION CONTROL. Jour. Forestry 32: 1007-1009. December 1934.

"Mr. Holt has stated a first principle in the subject of integrating forestry and game management . . . when he stresses the importance of scientists in different fields . . . working together and in this way developing an appreciation each of the other's problem."—Editor.

(4034)

THE SOIL EROSION SERVICE AND WILDLIFE. Amer. Game Conf. Trans. 21: 319-325. 1935.

A complete land-use program must provide for wildlife. "The cornerstone of our whole system is the maximum use of vegetation in stabilizing the soil . . . The species selected for planting are deliberately chosen for their value as wildlife food and cover, as well as for their erosion-resistant qualities." The Coon Creek, Wis., project is the only one on which a full year of wildlife work has been done, and the valuable experience gained is discussed. The greatest problem is "the development of adequate incentives for the farmer to carry on the work after the expiration of the demonstration period."

(4035)

WILDLIFE IN SOIL AND WATER CONSERVATION. ANIMAL LIFE IS AN IMPORTANT FACTOR IN SOIL POROSITY AND WATER RETENTION. Amer. Wildlife 25: 86, illus. November-December 1936.

It is pointed out that while the principles of water behavior and the influence of vegetation on land-water relationships have been considered at length, the relations of animals to soils and soil moisture has not been treated. "It is almost trite to say that the entire biota rests squarely upon the twin foundations of soil and moisture, for no kind of life can thrive either in absolutely dry earth or in chemically pure water . . ."

(4036)

WILDLIFE MANAGEMENT BY THE SOIL CONSERVATION SERVICE. U. S. Soil Conserv. Serv. SCS-MP-5, 5 pp. 1936 [Mimeographed.]

Discusses the objectives of the Soil Conservation Service in wildlife management. The objectives of the Service stated broadly are: "To propagate

the use of soil conservation in agriculture through the medium of demonstration; to effect at the same time a maximum control of erosion on as large an area of agricultural land as possible; and to ascertain the fundamental scientific facts essential to the development and improvement of soil-conservation methods and technics." The relation of wildlife management to soil conservation is pointed out.

HOLT, E. G. (4037)

WOODLAND CONSERVATION AND WILDLIFE PRESERVATION. *The Land, Today and Tomorrow* 2: 18-21. April 1935.

Discusses the ravages of erosion resulting from forest denudation and the program of the Soil Erosion Service in forest and game conservation.

HOSLEY, N. W. (4038)

FOOD AND COVER FOR WILDLIFE. MANY WOODY PLANTS PROVIDE BOTH THESE NECESSITIES ON A MORE PERMANENT BASIS. *Amer. Wildlife* 25: 36, 44-46, illus. May-June 1936.

"Many of the woody plants produce a large volume of food material per unit of ground area; they are especially valuable in erosion control; they require little care and . . . persist for years." Bibliography at close of article.

LANG, DOUGLAS. (4039)

CONSTRUCTING A GAME COVER. FINDING GOOD TREES FOR ROOSTING. *Field* [London] 167: 642. March 21, 1936.

Suggests various species of trees and shrubs valuable for pheasant roosting cover, with recommendations for planting form and spacing.

(4040)

CONSTRUCTING GAME COVERTS, A PAYING FORM OF FORESTRY. *Field* [London] 167: 516, illus. March 7, 1936.

Contains suggestions for maintaining coverts for wild and tame pheasants, including notes on the food habits, and diseases which attack these birds in improper habitat.

LÉCOMPTE, E. LEE. (4041)

RESTORATION OF COVER FOR WILDLIFE. *Md. Conservationist* 13: 19-22, illus. Fall 1936.

"The farmers, not only of Maryland but of a great many states in the Union, have so intensified their activities as to have cleaned out hedge rows, fence rows, meadow covers, and in fact have denuded land areas to such an extent that they have destroyed nesting sites and cover for wildlife." Bird feed patches have been planted (150 patches at a total cost of \$93.75) by farmers in cooperation with the State game department.

LEOPOLD, ALDO. (4042)

FARM GAME MANAGEMENT IN SILESIA. *Amer. Wildlife* 25: 67-68, 74-76, illus. September-October 1936.

"The climate of the Silesian plain is similar to that of Ohio." The German method of managing agricultural crops and game, the "remise" system is described and illustrated.

(4043)

REPORT ON A GAME SURVEY OF THE NORTH CENTRAL STATES. 299 pp., illus. Madison (Wis), American Game Assoc. 1931.

"The purpose of this survey is to appraise the chance for the practice of game management as a means to game restoration in the north central region. It attempts to describe game conditions as they exist, the opportunities which those conditions offer, the human machinery available for acting on them, and the probable consequences of their further neglect." Erosion control is treated, pages 247-249.

LONG, W. H. (4044)

AUTOBIOGRAPHY OF A RING-NECKED PHEASANT: AS REVEALED BY AN INVESTIGATION OF WILDLIFE CONDITIONS. *Amer. Forests* 42: 7-10, 32, 44, illus. January 1936. [Also in *Minn. Conservationist* No. 34, pp. 11-13, 15-19. March 1936.]

The author, who is engaged in wildlife research at the University of Michigan, makes the following statement: "In preparing this story, I have

taken the role of a pheasant and have attempted to interpret its life under environmental conditions as found today." Illustration shows a mowing machine equipped with flushing-bar.

McATEE, W. L.

(4045)

FRUITS ATTRACTIVE TO BIRDS. U. S. Bur. Biol. Survey, Wildlife Research and Management Leaflets BS Nos. 41-50. 1936. [Mimeographed.]

(4046)

GROUPS OF PLANTS VALUABLE FOR WILDLIFE UTILIZATION AND EROSION CONTROL. U. S. Dept. Agr. Cir. 412, 11 pp., illus. 1936.

Discusses crop plants and their use in erosion control and classifies the various plantings under the following headings: Grass, legumes, cover plants, browse plants, herbage, mast producers, fruit producers, and seed producers. Concludes with a consolidated list of plants that have been recommended for erosion control, showing their value for wildlife.

(4047)

HOW TO ATTRACT BIRDS IN NORTHEASTERN UNITED STATES. U. S. Dept. Agr. Farmers' Bull. 621, 18 pp., illus. 1914. [Revised, 1931.]

"This bulletin is one of a series intended to describe the best methods attracting birds in various parts of the United States, especially by providing a food supply and other accessories about the homestead."

(4048)

PLANTS VALUABLE FOR WILDLIFE UTILIZATION AND FOR EROSION CONTROL. U. S. Bur. Biol. Survey Leaflet BS-19, 11 pp. 1935. [Mimeographed.]

"Among methods of controlling erosion, the establishment and maintenance of vegetative cover on the soil is favored as being simple and effective, economical and lasting." The author lists plants, shrubs, etc., under the following headings: Grasses, legumes, cover plants, browse plants, herbage, mast producers, fruit producers, seed producers, and a consolidated list of plants recommended for erosion control.

(4049)

PROPAGATION OF UPLAND GAME BIRDS. U. S. Dept. Agr. Farmers' Bull. 1613, 61 pp., illus. 1930.

"No land is too good for a game farm. Those who hope to succeed on tracts useless for other purposes, on barren areas where almost every particle of food consumed by the birds must be brought in and hand fed, will rear their birds only at much greater cost of efforts and funds, and probably will suffer many disappointments. Soil fertility is not only an initial requirement for the successful game farm; it must also be maintained." Suggestions on soil fertility and conservation are briefly outlined.

(4050)

THE RELATION OF BIRDS TO WOODLOTS IN NEW YORK STATE. Roosevelt Wild Life Bull. 4: 7-152, illus. October 1926.

"The purpose of this paper is to reveal the part played by the bird population of woodlots, to demonstrate the advantages of taking birds into consideration in woodland management, and to show how this can in fact be accomplished."

(4051)

WORK OF THE DIVISION OF FORAGE CROPS AND DISEASES IN RELATION TO WILDLIFE MANAGEMENT. Wildlife Rev. 3: 27-31. 1936.

"This Division of the Bureau of Plant Industry, U. S. Department of Agriculture, is interested in legumes and other forage plants from the standpoint of hay or pasturage. It is realized that the seeds of many of these plants as sorghums, lespedezas and others are utilized by game birds and other wildlife, and in some cases the growing crop may make a more or less satisfactory cover." Bulletins prepared by the Division are listed with brief comment on the plants discussed, especially in relation to wildlife.

MARSHALL, ROBERT.

(4052)

THE WILD LIFE PROBLEM ON INDIAN RESERVATIONS. Indians at Work 3: 14-16. May 15, 1936.

Presents the difficulties for fish and game regulations in areas occupied by Indians, with major tenets of Indian policy by which it is hoped that

Indians will impose upon themselves voluntarily necessary restraint in hunting, trapping, and fishing in the interest of wildlife conservation. "The solution of the Indian wild life problem lies not in the compulsory enforcement of the white man's restrictions, but in a better means of livelihood and more self-government."

MERESHON, RALPH.

(4053)

WILD LIFE, A NEW FARM CROP. *South. Agr.* 67: 6, 27, illus. October 1936.

When farmers provide for game they control erosion.

MORTON, J. N.

(4054)

A GAME RESTORATION JOB FOR EVERYONE. SIMPLE WAYS IN WHICH YOU CAN HELP IMPROVE WILDLIFE CONDITIONS. *Pa. Game News* 7: 4-7, 24, illus. May 1936.

The author discusses cover, food, and protection for wild birds and beasts in Pennsylvania and includes sketches showing various devices for construction of coverts on farms and for flushing during harvest.

(4055)

WILDLIFE: AN IMPORTANT FOREST PRODUCT. *Jour. Forestry* 34: 40-45. January 1936.

Presents an outline of wildlife and recreational management objectives and plans of the game commission and other agencies of Pennsylvania, with suggestions for refuges, game food, and cover. "The backbone of any state-wide scheme of wildlife management is the forest . . . There is an opportunity for public service open to the State that develops its forests and waste lands in conformance with the principle of highest land use, recognizing the distinction between tree development for wood volume alone and tree development to favor all uses of the forest . . ."

MURDOCH, E. C.

(4056)

SOIL CONSERVATION SERVICE INAUGURATES WILDLIFE MANAGEMENT PROGRAM. *Ill. Conserv.* 1: 3. Spring 1936.

Discusses the cooperative program in Illinois for wildlife protection, with reference to demonstrational work of the Soil Conservation Service regarding bird and animal habitats, food, and cover requirements.

NORTH AMERICAN WILDLIFE CONFERENCE.

(4057)

TRANSACTIONS OF THE SECOND NORTH AMERICAN WILDLIFE CONFERENCE, MARCH 1, 2, 3, 4, 1937, . . . ST. LOUIS, MISSOURI. 661 pp., illus. *Amer. Wildlife Inst.* 1937.

Papers on the relation of wildlife management to soil conservation are as follows: An address by Henry A. Wallace, pages 15-19; Soil and Wildlife Conservation by Ernest G. Holt, pages 78-82; The Dependence of Soils on Animal Life, by W. R. Van Dersal, pages 458-467; Natural Vegetation in Soil Conservation and Wildlife Management, by H. L. Whitaker, pages 468-475.

PACK, A. N.

(4058)

A PLAN FOR CONSERVATION. *Nature Mag.* 27: 169-172. March 1936.

A three-point plan for wildlife conservation is proposed for study by the National Wildlife Conference held in Washington, D. C., in 1936, and presents a proposed outline of federal bureau reorganization under a centralized Bureau of Conservation of Renewable Natural Resources. The Clarke-McNary Act is cited as a precedent for proposed procedures in forest protection and conservation.

PEARSON, A. M.

(4059)

WILDLIFE AND SOIL CONSERVATION. *Sandy Creek News* 2 (6): 2-3. April 1936. [Mimeographed.]

Suggests field borders and slopes as suitable places for combining erosion-control and wildlife development measures. Plants are listed which have proven successful for erosion control and cover for game, song, and insectivorous birds, and which provide fruits and seeds for many forms of animal life when these foods are normally deficient.

PHILLIPS, PAUL.

(4060)

THE DISTRIBUTION OF RODENTS IN OVERGRAZED AND NORMAL GRASSLANDS OF CENTRAL OKLAHOMA. *Ecology* 17: 673-679. October 1936.

"Comparative data were obtained on the distribution of various common rodents and lagomorphs in grasslands of central Oklahoma . . . Jack-rabbits were most abundant in moderately overgrazed areas and cottontails preferred the cover afforded by undisturbed grasslands." Data are also given regarding gophers, ground squirrels, deer mice, and cotton rats. "The action of the rodents on the soil opposes that of hoofed animals . . . and they should not be eliminated from grazing lands because they counteract the packing effect of hoofed animals."

RUHL, H. D. .

(4061)

FARM-GAME MANAGEMENT; COORDINATION WITH USUAL FARM PRACTICE IMPERATIVE. *Amer. Wildlife* 25: 35, 42-44, illus. May-June 1936.

Wildlife management from the agricultural point of view is treated. Various recommendations for coordination of farm methods and game protection are made. States that "the elimination of grazing in farm woodlots would permit thousands of acres to grow excellent wildlife cover where it is needed badly" and "the limitation of agricultural crop production and the retirement of submarginal land offers an encouraging opportunity for dedication of such land to wildlife production." Paper presented at North American Wildlife Conference, 1936.

Bibliography at close of article.

SEXTON, B. L.

(4062)

OREGON'S WILDLIFE RESOURCES. 126 pp., illus. *Oreg. State Planning Bd.* 1936. [Mimeographed.]

A survey of Oregon's wildlife resources and the problems of wildlife conservation and management in the State. The great economic and social value of wildlife to Oregon is clearly shown, also the immediate need for conservation measures to perpetuate this resource. Interesting data on principal species of wildlife and their habitat are included.

SHELDON, H. P.

(4063)

DUST IS SOMETHING TO WORRY ABOUT. (Editorial.) *Field & Stream* 41: 19. June 1936.

This editorial justifies the interest of the Bureau of Biological Survey in dust storms, indicating that the Bureau knows that if dust storms and soil erosion by floods can be reduced or abated, the number of birds, animals, and fishes will increase. The following statement is made: "It is a fortunate thing for sportsmen and nature lovers that between the Soil Conservation Service and the Biological Survey there is complete understanding and sympathy, and none of the fumbling stupidity and cross-purpose frustration which has sometimes characterized the operations of great human agencies. The Soil Conservation Service is anxious to conserve soil and restore wildlife; the Biological Survey is anxious to restore wildlife and conserve soil. Each is able to direct its extensive operations in a way to assist the other agency, and with greater benefits to the nation they both serve."

(4064)

GAME AS A FARM CROP EMPHASIZED BY AGRICULTURAL ADJUSTMENT. U. S. Dept. Agr. Yearbook 1935: 220-221. 1935.

"Planting to improve cover can well be made to serve a double purpose by using food-producing vegetation, and a triple use by carrying it on where erosion control is needed: Greenbriers or catbriers, blackberries, dewberries, grapevines, Virginia creeper, and Japanese honeysuckle—to mention a few examples—have a threefold usefulness—as soil binders, as food producers and as cover."

(4065)

GAME LAWS FOR THE SEASON 1936-37. A SUMMARY OF FEDERAL, STATE AND PROVINCIAL STATUTES. U. S. Dept. Agr. Farmers' Bull. 1766, 37 pp. 1936.

Gives regulations for all States of the Union, Alaska, Canada, and Mexico.

SILCOX, F. A. (4066)

IN THE MAKING—A NEW WILDLIFE ERA. *Nation's Agr.* 11: 12-13, 21, illus. April 1936.

Summarizes the National Wildlife Conference, and discusses the interest of farmers, sportsmen, and the general public in the restoration and conservation of wildlife resources. Emphasizes need for forest management in the interest of wildlife and also need for fundamental research in regard to interrelationships of wildlife, its life histories, breeding, feeding habits, and diseases.

OBJECTIVES OF THE NORTH AMERICAN WILDLIFE CONFERENCE. *Jour. Forestry* 34: 376-379. April 1936. (4067)

"Its perpetuation, its future aims, aspirations, and methods of representation, are subject to its own decisions. The hope is that through its deliberations new cooperation between private, public, and international interests will develop; that from it will come constructive proposals; that through these proposals there may be evolved such intelligent, concerted, and cooperative action as will help restore and conserve some semblance of our original wildlife resources."

STANFORD, J. E. (4068)

GAME MANAGEMENT ON THE FARM. *South. Agr.* 67: 17. March 1937.

The benefits of wildlife as a farm crop, from a money-making, and also erosion-control viewpoint are pointed out.

STEVENS, ROSS O. (4069)

HANDBOOK OF WILDLIFE MANAGEMENT FOR REGION 2. U. S. Soil Conserv. Serv. SCS-RB-3, 31 pp., illus. 1937.

"The purpose of this handbook is to indicate how wildlife management can be coordinated with the general soil-conservation program in the Southeastern Region and how individual landowners can apply erosion-control practices which will improve environments for game and other desirable species of wildlife."

WILDLIFE CONSERVATION THROUGH EROSION CONTROL IN THE PIEDMONT. U. S. Dept. Agr. Farmers' Bull. 1788, 26 pp., illus. 1937. (4070)

"The purpose of this bulletin is to show how gullies, terrace outlets, waterways, eroding field borders, pastures, and woodlands in the Piedmont region may be protected against erosion through the use of vegetation that will also provide food and cover for wildlife."

STORMS, DUNC. (4071)

OUR BEAVER. *Nature Mag.* 27: 48-49, illus. January 1936.

"The work of beavers is erosion prevention . . ." The author recommends 5 years of Federal beaver protection, with transference of the dam-building animals to river headstreams having shade, the removal of sheep from riverbanks and valleys, and widespread education of the people, especially sportsmen and fishermen, that they may know that beavers do not kill trout. Five years of beaver work as Nature plans will stop much small stream erosion.

SUMNER, E. L., JR. (4072)

A LIFE HISTORY STUDY OF THE CALIFORNIA QUAIL, WITH RECOMMENDATIONS FOR ITS CONSERVATION AND MANAGEMENT. *Calif. Fish and Game* 21 (3): 167-256. July 1935: 21 (4): 277-342, illus. October 1935.

The author summarizes the known facts about management of California quail and emphasizes necessity of cover patches with small open spaces for foraging. He states that "potent cause of the decrease of quail in modern times is the practice of removing all weeds and other vegetation not of direct visible use to man from fence rows, roadsides and unused corners about the farm." The author discusses erosion-control methods which are of benefit to quail, such as untilled grass strips in orchards, grass, weeds, and brush along ditches and in gullies, and the establishing of heavy grass clumps in overgrazed lands.

TAYLOR, W. P.

(4073)

THE BANNER-TAIL AND OTHER BURROWERS. *Amer. Forests* 42: 68-70, illus. February 1936.

A description of the banner-tail kangaroo rat (a species of the *Heteromoyidae*) and other rodent denizens of the southern semidesert lands from western Texas to western Arizona. Includes notes on burrowing habits, food storing, adaptation to climate, economic status, and benefits by soil making and insect consumption.

(4074)

A NATIONAL WILDLIFE SURVEY, A BIOLOGICAL INVENTORY OF NATIONAL ORGANIC RESOURCES IS NEEDED. *Amer. Wildlife* 25: 69, 77. September-October 1936.

The suggestion is made that the Government undertake a wildlife survey which "would indicate, more definitely than we know them at present, the outstanding needs for cover control; for regulating numbers of potential pests; and for wildlife conservation and restoration."

(4075)

THE PRINCIPLE OF "DIVERSIFICATION" IN THE WILDLIFE FIELD. *Science* 84: 350-351. October 16, 1936.

The writer urges the maintenance of land under as nearly as possible natural conditions. Examines the present situation which has brought about a deterioration of the soil and decline of wildlife and then outlines a picture as it might appear in a Texas pine forest with climate, soil, animal, and plant population operating as a balanced enterprise. It is pointed out that such a balance is the equivalent; in the field of wildlife and natural resources management, of diversified farming in agriculture.

(4076)

SOME ANIMAL ASPECTS OF REFORESTATION AND EROSION. *Jour. Forestry* 32: 8-10. January 1934.

Recommends that the control of native animal life should be considered locally and specifically and that expert study and diagnosis should be made of a locality before a comprehensive work program is set up. The author discusses the Emergency Conservation program and believes there is no universally applicable hard and fast sample-plot method of approach to many of the bioecological problems.

(4077)

SOME ANIMAL RELATIONS TO SOILS. *Ecology* 16: 127-136. April 1935.

The relation to and effect on the soil of accumulating animal bodies or parts is pointed out; effects of beaver activities on dam building and flooding are given. Observations in Kansas "indicated that all burrowing insects that go below 6 inches will effect a gradual interchange of soil and subsoil in varying amounts."

(4078)

SOME EFFECTS OF ANIMALS ON PLANTS. *Sci. Monthly* 43: 262-271. September 1936.

The harmful and beneficial relationship of plants and animals, with notes on browsing animals, consumption and dissemination of seeds by animals, pollinating functions of insects and birds, and rodent assistance in forest maintenance are discussed.

TERRES, J. K.

(4079)

THE WILDLIFE PROGRAM OF THE SOIL CONSERVATION SERVICE. *Pa. Acad. Sci. Proc.* 10: 19-25. 1936.

"Soil conservation and wildlife conservation go hand in hand. When agricultural lands are made more habitable for man, they generally become more habitable for wildlife creatures. Fertile soil and a rich and varied wildlife population go together. Improved lands producing vegetation offer far better environments for wildlife than eroded, infertile soil, plagued by floods or stifling dust storms." This article gives an outline of the research work and control methods in wildlife management now being carried out by the Soil Conservation Service.

- TUBBS, F. F., and BRADT, G. W. (4080)
 PLANTING OF FOOD PATCHES FOR WILD LIFE. Mich. Dept. Conserv. Game
 Mangt. Cir. 1, 4 pp. 1936.
 Advice on plant foods of grain, seeds, fruits, and shrubs is given with
 instructions for preparation of soil and seedbeds.
- UNITED STATES BUREAU OF BIOLOGICAL SURVEY. (4081)
 FIFTY COMMON BIRDS OF FARM AND ORCHARD. U. S. Dept. Agr. Farmers' Bull.
 513, 31 pp., illus. 1913.
 Furnishes concise information as to the nature of the good or harm cer-
 tain birds do on the farm and in the orchard, and facilitates the study by
 the use of colored illustrations, thus enabling the observer to identify certain
 birds more rapidly than by printed description.
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- REPORT OF THE CHIEF . . . 1936. 68 pp. Washington, Govt. Print. Off.
 1936. (4082)
 Draws attention to the relation of rodent control to soil conservation,
 page 65. The destruction of terraces in Baca County, Colo., by kangaroo
 rats is described.
- UNITED STATES BUREAU OF RECLAMATION. (4083)
 WILDLIFE RESERVATIONS ON RECLAMATION PROJECTS. Reclam. Era 26: 43.
 February 1936.
 Memorandum of agreement between the Secretary of the Interior and the
 Secretary of Agriculture respecting administration of reclamation projects
 which are also wildlife refuges.
- UNITED STATES DEPARTMENT OF AGRICULTURE. (4084)
 REPORT OF PRESIDENT'S COMMITTEE ON WILD-LIFE RESTORATION. 27 pp., illus.
 Washington, Govt. Print. Off. 1934.
 "A national wild-life restoration program is economically justifiable and
 immediately practical by utilizing submarginal and commercially unprofit-
 able agricultural lands now contributing so largely to the surplus of agricul-
 tural products."
- [UNITED STATES] NATIONAL RESOURCES BOARD, LAND PLANNING COMMITTEE. (4085)
 PLANNING FOR WILDLIFE IN THE UNITED STATES. U. S. Natl. Resources Bd.,
 Land Planning Com., Sup. Rept., pt. 9, 24 pp., illus. 1935.
 "On November 28, 1934, The National Resources Board submitted to the
 President, in accordance with an Executive order, its report on National
 Planning and Public Works in Relation to Natural Resources and Including
 Land Use and Water Resources. In the course of preparing part 2 of the
 above report a large volume of basic data and information was collected
 which could not then be included. The publication of the present report is
 for the purpose of making such data and information available to interested
 persons and organizations. The present land report has been organized
 into 11 parts according to subject matter and the contributing agencies." Section 1 concerns requirements for wildlife areas, section 2, policies with
 respect to wildlife, and section 3, wildlife management in national forests.
- UNITED STATES SOIL CONSERVATION SERVICE. (4086)
 SOIL CONSERVATION AND WILDLIFE. 6 pp., illus. Washington, D. C. 1936.
 "Soil conservation and wildlife conservation are inseparable because
 both involve the restoration of vegetative cover, in one case to protect
 the soil, in the other to protect and provide for animal life." A few simple
 land-use practices are outlined for erosion control. The objectives of the
 Soil Conservation Service in wildlife management are also summarized.
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- WILDLIFE CONSERVATION PLAN FOR PENNSYLVANIA. Soil Conserv. Serv. 25 pp.,
 illus. 1936. [Mimeographed.] (4087)
 Among other things the relation of the plan to soil-erosion control is
 described. The three objectives of the plan and the procedure for their
 accomplishment are summarized briefly. Considerable data are given for
 different types of planting.

VAN DERSAL, WILLIAM R.

(4088)

SOIL CONSERVATION AND THE NORTH AMERICAN WILDLIFE CONFERENCE. Soil Conserv. 1: 15. March 1936.

"Upon invitation of the President of the United States there met in Washington, D. C., February 3 to 7, 2,500 persons interested in the conservation of natural resources, particularly wildlife . . . The control of erosion through vegetation as practiced by the Soil Conservation Service was shown to bear definitely and fundamentally on the restoration of wildlife habitats and the improvement of conditions for birds, fish, and mammals."

VORHIES, C. T.

(4089)

RODENTS AND CONSERVATION. CONTROL PROJECTS PROVIDE EASY BUT DUBIOUS WAY TO SPEND MONEY. Nature Mag. 28: 363-365, 379, illus. December 1936.

"There has been, on some of the erosion projects, a tendency to damn, convict, and sentence the rodents to death on a large scale on areas to be worked for erosion control . . . Surely in an area in which burrowing rodents are so important in the loosening up and aeration of the soil—as in our earthwormless, arid southwest—the little animals deserve to have the possible benefits they confer on the soil carefully balanced against the possible effects of increasing erosion. It may be fairly questioned whether rodents, by and large, are important in causing erosion directly." The writer finds that the cost of rodent control is not justified by the benefits, if any, that are received.

WALLACE, H. A.

(4090)

A PRODUCT OF THE SOIL. AS SUCH, WILDLIFE RESTORATION IS A PROBLEM OF LAND MANAGEMENT. Amer. Wildlife 26: 21, 27-28, illus. March-April 1937.

An address before the second North American Wildlife Conference, St. Louis, Mo., March 1-4, 1937. The Secretary of Agriculture tells how delays in the establishment of Federal waterfowl refuges and sanctuaries and the reclamation of marsh and water areas for the preservation of aquatic life have been very costly. "If major reforms concerning the use of land, water, forests, and wildlife had been adopted 50 or 100 years earlier than they were, there would have been little cause for our present anxiety concerning the grave problems of soil erosion and the uses of submarginal land; our streams and lakes would now be free of pollution; we would still have vast wilderness areas in reserve and an abundance of all the original forms of wildlife."

WESTFELD, R. H., AND BENNITT, RUDOLPH.

(4091)

IMPROVING FOOD AND COVER FOR WILDLIFE ON MISSOURI FARMS. Mo. Agr. Col. Ext. Cir. 348, 8 pp. 1936.

"There are fewer wild birds and animals in Missouri than formerly because there is less suitable land for them." Improvement and maintenance of favorable woodland conditions for wildlife is stressed.

WHITAKER, H. L., AND OSBORN, BEN.

(4092)

WILDLIFE MANAGEMENT—EROSION CONTROL IN THE CENTRAL GREAT PLAINS REGION. A HANDBOOK FOR SOIL CONSERVATION SERVICE TECHNICIANS. U. S. Soil Conserv. Serv. SCS-RB-6. 63 pp., illus. 1937. [Mimeographed.]

Contents: wildlife management; management of natural vegetation; the protection of stream banks and gully control; woodlot plantings; cover crops; and rodent and insect control.

Literature cited, pages 53-56.

WILSON, K. A., AND VAUGHN, E. A.

(4093)

THE LAND RESETTLEMENT ADMINISTRATION AND ITS WILDLIFE PROGRAM ON THE EASTERN SHORE OF MARYLAND. Md. Conserv. 13: 21-26, illus. 1936.

The scope and character of the wildlife program and its procedure are outlined. Cover provision of brushland, woodland, and grassland are advocated.

—AND VAUGHN, E. A.

(4094)

THE RESETTLEMENT ADMINISTRATION AND ITS WILDLIFE PROGRAM ON THE EASTERN SHORE OF MARYLAND. Md. Conserv. 13: 1-3, illus. 1936.

"On land unplowed for years, partridge pea, ragweed, buttonweed, and other food-producing plants have sprung up where before there was nothing

but beard grass . . ." A campaign for cleaning old, neglected ditches resulted in areas of food patches for small game.

WING, L. W. (4095)

NATURALIZE THE FOREST FOR WILDLIFE. Amer. Forests 42: 260-261, 293, illus. June 1936. [Discussion by F. Morrell in Amer. Forestry 42: 363-365, illus. August 1936.]

The author discusses forestry methods and wildlife protection, with suggestions for satisfactory use of plantations for wildlife carrying capacity of the land. "Some means must be sought to reconcile forestry and wildlife. The true aim of conservation is a balance of land use for recreation, wildlife, lumber, stream-flow, and beauty . . ." In referring to the destruction of browse for wildlife, he says: "I fear we shall look upon these early days of C. C. C. as a crowning blunder in conservation." Morrell defends the work of the C. C. C. pointing out its cooperation with the United States Bureau of Biological Survey in the development of wildlife projects and its clean-up work of litter in the woods to prevent forest fires and consequent death of wildlife.

WYMORE, F. H. (4096)

CONSERVATION OF WILDLIFE. Soil Conserv. Digest 3 (1): 6-9. October 1936. [Mimeographed.]

Discusses game as an annual crop, wildlife refuge, border planting, wildlife lanes, barrancas, ill effects of fire and overgrazing on wildlife, watering stations, control of predators, returns to farmer, and game management.

ZEH, W. H. (4097)

SOME PROBLEMS IN WILD LIFE MANAGEMENT ON RESERVATION. Indians at Work 3: 9-11. June 1, 1936.

The writer discusses difficulties of wildlife management on Indian reservations where unrestricted hunting rights were granted in early treaties and suggests definite education and administration as a remedy.

WIND EROSION, WINDBREAKS, AND SHELTERBELTS

ANONYMOUS. (4098)

BINDING DRIFT SAND. Jour. Agr. [South Aust.] 3: 552-555. February 1900.

"Care should be taken to prevent further drift. This can best be done by preserving as far as possible the natural vegetation, and planting on spots showing a tendency to drift, some of the proved sand-binding plants." The writer lists and describes a number of grasses and plants, among them some that make feed for stock and are valuable as sand binders. "Many of the plants referred to in the foregoing are recommended in the Year Book of the U. S. A. Department of Agriculture."

(4099)
CITRUS RETURNS SHOW VALUE OF WIND PROTECTION. Calif. Citrogr. 22: 376. June 1937.

A brief account of a windbreak survey by H. E. Wahlberg, of Orange County, Calif. "The difference of \$174 per acre between the protected and unprotected valencia orchards represents an earning of 10 per cent on an increased valuation of \$1740 per acre, according to Wahlberg."

(4100)
COMBATING SAND DRIFT IN THE MALLEE. EFFECTS OF WIND CHUTE FENCES. Commonwealth Engin. 23: 217-218. February 1, 1936.

Gives details of wind-chute-fence construction for the prevention of fine-particled-sand accumulations in railway cuttings, as used in the Mallee district of Victoria. Also explains the inefficacy of planting methods in combating fine-grained-sand drift.

(4101)
THE DUST BOWL AREA. Science 84: 113-114. 1936.

Contains preliminary announcement of erosion survey undertaken in the southern Plains area. "The results of this survey indicate clearly . . . that the Southern Plains is not yet a desert by any means and that the oppor-

tunity for agriculture there is far from ended. Nevertheless, the Southern Plains farmer must quickly adapt himself to natural conditions, if wind erosion is not to spread throughout most of the region. Conservation farming, involving precautionary crop planning, contour tillage and other measures of soil and moisture conservation must be adopted."

ANONYMOUS.

(4102)

500,000,000 TONS OF DUST COVER KANSAS AND POINTS EAST; A. A. A. MOVES TO SAVE NATION'S 'BREAD BASKET.' News-Week 5: 5-6, illus. March 30, 1935.

Describes the havoc wrought by the midwestern dust storm of March 1935. Soil erosion is cited as the greatest evil resulting from such storms. The control program of the A. A. A. and cooperating Federal agencies is outlined.

(4103)

A GREAT [SAND] STORM. Pacific Rural Press 11: 37, 60. January, 1876.

A description of a terrible sandstorm at Kern, Calif., when "the sky was obscured almost to darkness." Not less than 30,000 sheep perished, buried by the drifting sand.

(4104)

PLAINS PENANCE; GOVERNMENT OUTLINES SCOURGE, AID FOR DUST STATES. Lit. Digest 123: 8-9, illus. February 27, 1937.

"Man's sin against nature in the Great Plains States mocked him again last week as dust storms sprang up to devastate hundreds of square miles of precious soil." The report of the Great Plains Committee is reviewed. In its recommendations, the committee outlined actions for Federal, State and local authorities, and concluded by stating that "if economic deterioration of the Great Plains region, recently heightened as a result of the depression and drought, is to be stopped, it will be only because the Nation takes the situation in hand promptly, emphatically and competently."

(4105)

THE RECENT DESTRUCTIVE DUST CLOUD. Science 79: 473. May 25, 1934.

The source of dust clouds is excessively grazed areas and the plowing up of naturally well-sodded land. "The nation should take warning from the present disastrous dust storm, and adopt measures to avoid future damage."

(4106)

RECORD DUST STORM EMPHASIZES SOIL EROSION PROBLEM. Engin. News-Rec. 112: 680. May 24, 1934.

The dust storm of May 1934 in the upper Mississippi Valley is described, together with dust storms of lesser magnitude.

(4107)

A SANDY SIMOON IN THE NORTHWEST. Amer. Geol. 3: 397-399. 1889.

"May sixth and seventh, 1889, will long be remembered by the residents of the Northwest. On those days culminated the violence of the dry, southeasterly wind which had prevailed in some portions of the Northwest, particularly in central and eastern Dakota, for several days previous." A description of the storm follows. "The occurrence of this storm has a bearing on theories of the origin of the loess. Its area is that over which the loess is abundant."

(4108)

SEVEN WINDBREAK TREES RECOMMENDED FOR NORTHERN GREAT PLAINS. Amer. Forests 42: 575. December 1936.

Chinese elm, green ash, chokeberry, boxelder, Siberian pea-tree, buffalo-berry, and American plum are recommended for windbreak planting after 20 years of testing in the northern Great Plains.

(4109)

SHIFTING SOILS. Pacific Rural Press 19: 200. March 1880.

On damage done by high winds at Contra Costa, Calif., where "acres of grain growing upon light soil" were torn out and large areas buried under sand drifts.

- ANONYMOUS.** (4110)
 TONS OF SOIL SHIFT IN RECENT DUST STORM. *Farm and Ranch* 53: 12. June 15, 1934.
 A brief description of two dust storms on November 1933, and May 1934. Statistics on the dust content of the air are given. Also discusses the origin of such storms.
- AICHER, L. C.** (4111)
 CURBING THE WIND. *Kans. State Bd. Agr. Bien. Rept.* (1933-34) 29: 67-71. 1935.
 The blowing of soil, except in very sandy areas, is a sign of carelessness, and the secret of prevention is to keep the surface in a roughened condition by proper tillage implements and by the binding effect of crop residues. Methods used on annually cropped land and fallow land are outlined. "The lister or other implement should be started through the field at right angles to the direction of the damaging wind and on the side of the field nearest the source of the wind."
- ALBERT, A. R.** (4112)
 COPING WITH SAND STORMS. *Wis. Agr. Col. Ext. Stencil Cir.* 148, 4 pp. 1934. [Mimeographed.]
 "Bare fields, dry soil, high wind, and an unobstructed sweep for the wind are the four factors which contribute to the severity of a sand storm." The author recommends shelterbelts for a permanent preventive measure. The prevention of dust storms is regarded as necessary for the common welfare. Costs of windbreaks are estimated.
- ALLEN, B. L.** (4113)
 DUST STORMS AND MID-WEST HIGHWAYS. *Pub. Works* 67: 18, illus. December 1936.
 Road conditions after dust storms, filling ditches, culverts, fields and pastures, and dust that is impervious to water are described. "There could be but one result, and that was a run-off of one to two hundred per cent of normal, and the erosion by water completed the job. It will require three years of normal rainfall seasons to get our roads back to the conditions they were in the spring of 1935."
- ALLEN, R. W.** (4114)
 WINDBREAKS, HEDGES AND ORNAMENTALS FOR IRRIGATED SANDY SOILS OF EASTERN OREGON. *Oreg. Agr. Expt. Sta. Bull.* 125, 24 pp., illus. 1915.
 "The protection afforded by trees as windbreaks is more effective than that of other forms of windbreaks owing to the greater height of the trees and the greater space between rows. Such windbreaks diminish evaporation of moisture from soils and from crops." Plants to use and arrangements of trees for windbreaks are suggested.
- ANDERSON, P. O.**
 DEMONSTRATION WINDBREAKS IN MINNESOTA. *Minn. Univ. Agr. Ext. Cir.* 23, 3 pp., illus. 1926.
 The cooperative windbreak project, inaugurated in 1920 by the Division of Forestry and the Agricultural Extension Division listing certain regulations for farmers, is described. Failure to establish successful windbreaks for 100 years on the prairies of Minnesota is compared with the results obtained since 1920. "Two years after planting, 74 percent of these trees were alive and growing in spite of the fact that several of the evergreen plantations were almost complete failures because of alkali soil." Of nine species used the majority planted were white spruce, Norway pine, or Scotch pine.
- (4116)
 PLANTING THE STANDARD WINDBREAK. *Minn. Univ. Agr. Ext. Div. Spec. Bull.* 168 (reprint) 8 pp., illus. 1937.
 "The standard windbreak project calls for a very substantial planting. One that will furnish adequate protection to the farmstead, and, if properly managed, will yield fuelwood, repair material, and, in time, lumber that will find a ready market locally." A planting plan is shown with instructions on how to plant such trees as Russian-olive, poplar, willow, ash, elm, pine, and spruce.

- ARNETT, F. B. (4117)
SHELTERBELTS TO CHECK EROSION. *Mont. Farmer* 23: 6-7. April 1, 1936.
A Montana farmer describes shelterbelt plantings which hold light sandy loam soils in a section where grass cover is inadequate to check wind erosion. Tree species used are Russian artemisia, *Caragana*, jack pine, Chinese elm, green ash, and juniper. Not examined.
- B., C. F., P., C. H., AND TALMAN, C. F. (4118)
DUST STORMS. *Amer. Met. Soc. Bull.* 15: 107-109. April 1934.
A discussion of two storms, the dust storm of November 12-13, 1933, in South Dakota, and the storm of December 15-16, 1933, in New England. Data are given on the soil content of the atmosphere during both storms, and an account is given of damage done to structures, and erosional effects upon the land.
- BAGNOLD, R. A. (4119)
THE TRANSPORT OF SAND BY WIND. *Geogr. Jour.* 89: 409-438. May 1937.
An account of recent experimental work on the mechanism by which sand is moved by wind over surfaces of sand and pebbles. The work has in the main been limited to flat, horizontal surfaces, but deductions are drawn concerning the growth and nourishment of dunes.
- BALDWIN, H. I. (4120)
THE FALL OF BROWN SNOW IN NEW HAMPSHIRE. *Science* 83: 371. April 17, 1936.
Gives weight figures of silt from brown snow which fell in New Hampshire February 25, 1936, the day after severe dust storms occurred in Colorado and other parts of the West.
- BARTON, T. F. (4121)
THE GREAT PLAINS TREE SHELTERBELT PROJECT. *Jour. Geogr.* 35: 125-135, illus. April 1936.
The author gives description and interpretation of the shelterbelt plan and the progress made toward its completion, with special emphasis on objectives, i. e., reduction of human suffering and crop losses, creation of wildlife haven, prevention of soil erosion, and the conservation of moisture.
- BATES, C. G. (4122)
BREAKING THE POWER OF PRAIRIE WINDS. *Canad. Forestry Mag.* 17: 336, illus. June 1921.
A brief account of methods employed in measuring the effect of windbreaks in lessening the force of the wind, checking evaporation, and in influencing the humidity of the air.
- (4123)
TREE WINDBREAKS AS A FARM ASSET. *Canad. Forestry Jour.* 16 (6): 280-284, illus. 1920.
"This article deals particularly with the economic importance of windbreaks to the prairie farms."—*Expt. Sta. Rec.* 43: 650. 1920.
- (4124)
THE WINDBREAK AS A FARM ASSET. U. S. Dept. Agr. *Farmers' Bull.* 788, 15 pp., illus., 1917. [Superseded by *Farmers' Bull.* 1405, 19 pp., illus. 1924. (Revised, 1936.)]
"This publication [*Farmers' Bull.* 788] discusses windbreaks with special reference to their use in protecting the fields and farm buildings from the force of the winds . . . Estimates are also given of financial returns per acre to be expected from various kinds of windbreaks."—*Expt. Sta. Rec.* 37: 46. 1917.
"This bulletin [*Farmers' Bull.* 1405] explains the general principles of protection obtained through planted windbreaks, the good and bad effects which may be expected therefrom, what species should be planted where only the hardiest succeed, and the care needed to maintain healthy tree growth."

- BATES, C. G. (4125)
WINDBREAKS: THEIR INFLUENCE AND VALUE. U. S. Forest Serv. Bull. 86, 100 pp., illus. 1911.

This bulletin presents data showing the effects of windbreaks upon field crops, with calculations of their value to the average farm of the Middle West. Part 1 is a synopsis of the general conditions underlying the utility of windbreaks, and a short study of the most important winds of the United States; part 2 deals with the construction of windbreaks; part 3 with the applicability of different species; and part 4 with a discussion of windbreaks for different regions of the United States.

- BATTEN, H. M. (4126)
THE TRAGEDY OF THE CULBIN SANDS. Nat. Hist. 38: 143-148, illus. September 1936.

"An amazing catastrophe in the nature of a sandstorm which in 1694 changed a section of the fair Scottish countryside into a miniature Sahara and made time stand still for more than two centuries." In 1695 "Parliament . . . passed an act prohibiting the pulling of bentgrass, juniper, and broom, the binding roots of which help to make the sandhills permanent. The act is still in force. And one of the most interesting planting schemes is at present in progress in order to fix the dunes to prevent the sands working farther inland. Marram grass is planted at short intervals, and other plants, such as *Carex arenaria*, which have strong, running roots, have at last obtained a hold on some of the more dangerous slopes. Corsican pine, Sea buckthorn and grey alder are systematically set by the foresters, who are ever watchful for dangerous 'blow outs' which might result in wholesale movement."

- BEAUMONT, A. B. (4127)
SOIL SHIFTING IN THE CONNECTICUT VALLEY. Science 56: 282-293. September 1922.

"In the Connecticut Valley in the vicinity of Amherst sand storms are a common occurrence . . . the winds most disastrous from the standpoint of soil erosion are those of two or more days' duration . . ."

- BENEKE, A. (4128)
DER EINFLUSS DES WINDES BELDER BILDUNG VON ACKERERDE. Naturwissenschaften 2: 396-398. April 17, 1914.

The results of wind formation are not so clearly seen as those of rivers and seas and hence have not made so deep an impression. Research in the future should determine three things: (1) The tearing away, (2) transportation, and (3) deposition of agricultural soils, by wind. Size determines the manner in which wind can deal with earth substances: Heavy material that the wind cannot move; heavy sand that the wind can blow about but not raise; fine sand (dune sands) that the wind can carry only a short distance; dust that can be carried long distances. The power of the wind in Indiana, in Australia, and in the Nile delta is discussed. Moisture and plant cover are the two obstacles to wind transportation of soil. The wind is of the greatest importance in soil building. Free is quoted as to wind-blown loess both in Europe and North America. The wind is a benefactor in watered and partially watered regions as it carries rich sediment that adds to soil formation and fertility.

- BENNETT, H. H. (4129)
CAN DUST STORMS BE CONQUERED? Conservation 1:1. June 1935.

The statement is made that the essence of erosion control is wise land management and that dust storms can be conquered without interfering with productive cultivation. Careless land use must give way to protective planting, wind-erosion control, and beneficial tillage operations.

- (4130)
THE VAGUE, ROAMING "DUST BOWL." A NEW PICTURE OF THE REGION IN WHICH THE SOIL BLOWS; THE PROBLEMS CREATED BY PAST MISTAKES, AND THE OUTLOOK. N. Y. Times Mag., pp. 1, 2, 17. July 26, 1936.

Presents a picture of that area of the United States which has become known as the "dust bowl" and points out at the same time certain misconceptions which have arisen in regard to this area. "The thing to remember is that exposed Great Plains soil in dry years will blow. How much damage

the blowing has done cannot be determined precisely by mathematics. The Soil Conservation Service has made a survey of twenty counties, lying near the adjacent boundary lines of Kansas, Oklahoma, Texas, Colorado, and New Mexico, and including about 25,000 square miles. Eighty percent of the whole area is affected by wind erosion of one type or another (which means dust) and about 40 percent of it has been seriously damaged . . . Rain alone is not enough to put an end to wind erosion . . . Lashing the soil to the earth with a protective mantle of vegetation is the only remedy."

BODE, I. T. (4131)
SHELTERBELT AS AN ASSET ON THE IOWA FARM. Iowa Agr. Col. Ext. Bull. 108, 16 pp., illus. 1924.

The value of the shelterbelt must be measured by increased gains in live-stock, better health and living conditions for both man and animals, decreased fuel bills, additional sale value for the farm, etc. Essentials of a good, permanent shelterbelt are cited, together with instructions for planting stock and its care.

BODROV, V. (4132)
THE INFLUENCE OF SHELTERBELTS OVER THE MICROCLIMATE OF ADJACENT TERRITORIES. Jour. Forestry 34: 696-697. July 1936.

"Forest shelterbelts introduce considerable changes in the microclimate of adjacent regions. They serve as a mechanical obstruction to the wind, reducing its velocity and changing its behavior. Changes in the wind also cause changes in all of the principal meteorological elements, such as atmospheric moisture, temperature, and evaporation. Evaporation may serve as a best example of the efficiency of shelterbelts . . . Within a one-kilometer plot over the open and surrounded by shelterbelts 17 meters high, the saving in moisture due to decreased evaporation amounts to 17 percent of the total with wind velocities of 2.5 to 3 meters per second, and 25 percent with velocities of 5 to 6 meters per second."

BONNETT, W. E. (4133)
NOTE ON WEATHER AT FRESNO, CALIF., DURING JANUARY 1913. U. S. Monthly Weather Rev. 41: 119. 1913.

January 1913 was a month of abnormal and generally unfavorable conditions. During a severe dust storm on January 4, in loose light soils, grain was blown out in places or buried under wind-transported material. "This unusual dryness had an important effect in producing the record-breaking freeze on succeeding days . . . The month closed with some very pleasant but unseasonably warm weather."

BRANDON, J. F., and KEZER, ALVIN. (4134)
SOIL BLOWING AND ITS CONTROL IN COLORADO. Colo. Expt. Sta. Bull. 419, 20 pp. 1936.

"Wind erosion is today the most active, the most potent depleter of soil fertility on the Great Plains . . . Soil blowing has become a greater factor in Plains agriculture as it has become older . . . because the natural soil-binding sod rootlets of the original vegetation have become more thoroughly disintegrated." The season of greatest soil erosion, the prevailing direction of the soil-blowing wind and something of its nature in Colorado, types of surface soil likely to blow, and methods to follow in stopping wind erosion are discussed. A summary of good land-use practices is given in conclusion.

BROWN, E. G., GOTTLIEB, SELMA, and LAYBOURN, R. L. (4135)
DUST STORMS AND THEIR POSSIBLE EFFECT ON HEALTH WITH SPECIAL REFERENCE TO THE DUST STORM IN KANSAS IN 1935. U. S. Pub. Health Repts. 50: 1369-1383. October 4, 1935. [Also issued as Pub. Health Serv. Reprint 1707, 15 pp., illus. 1936.]

BRUNDY, C. M. (4136)
TREES FOR THE PRAIRIES. Amer. Forests 39: 553-555, 574, illus. December 1933.

Afforestation over an area of 400,000 square miles throughout the Great Plains region and the work of experiment stations in determining species of trees suitable to climate and environment are discussed. The history of tree growing in naturally barren plains is reviewed.

- BRYAN, K. (4137)
WIND EROSION NEAR LEES FERRY, ARIZONA. *Amer. Jour. Sci.* (5) 6: 291-307, illus. October 1923.
"The purpose of this paper is to record some of the writer's observations relating to erosion in Arizona and to point out the bearing of these observations on the general problem."
- BUTLER, O. (4138)
PRAIRIE SHELTER BELT. *Amer. Forests* 40: 395-398, 431, illus. September 1934.
This article consists of 30 questions and their answers concerning President Roosevelt's undertaking in forestry. "Public reaction to President Roosevelt's dramatic plan to bi-sect the Great Plains with a protective belt of forests in the main has been highly favorable."
- C, C. S. (4139)
WINDBREAKS PAY DIVIDENDS. *Rural New Yorker* 96: 75, illus. January 30, 1937.
The author shows how farmers in Iowa, Indiana, and New York benefited by planting windbreaks and recommends the use of Norway spruce and native white pine. Reasons for especially avoiding the Scotch pine are given. A few general instructions on windbreak location, planting, and maintenance are included.
- CAIRD, R. W. (4140)
TENDENCIES IN THE NATURAL REVEGETATION OF WIND EROSION AREAS ON THE NORTHERN GREAT PLAINS. *Amer. Soil Surv. Assoc. Bull.* 17, pp. 132-135, illus. 1936.
Preliminary report based on an intensive survey of the blowing areas in Beadle County, S. Dak.
- CALL, L. E. (4141)
CONDITIONS IN WESTERN KANSAS. *The Land, Today and Tomorrow* 2: 8-11, illus. April 1935.
Discusses the wind-erosion problem and suggests measures of control. A map shows the area in Kansas where destructive soil blowing is common.
- CULTURAL METHODS OF CONTROLLING WIND EROSION. *Jour. Amer. Soc. Agron.* (4142)
28: 193-201. March 1936.
A detailed discussion, including climatic data, of the prevention of disastrous wind erosion in the central Great Plains, presenting specific rules for cultivation of the soil and reestablishment of permanent vegetation on arid and sandy soils.
- CAMERON, D. C. (4143)
GREAT DUST STORM OF WASHINGTON AND OREGON, APRIL 21-24, 1931. *U. S. Monthly Weather Rev.* 59: 195-197, illus. May 1931.
A week previous to this storm "saw the end of a rather protracted wet spell in both States, which was succeeded by clear skies, very low relative humidity, under which the top layers of the soil had dried out very thoroughly so that the strong northeast winds that occurred on the 21st whipped up great quantities of dust from the wheat country and the semi-arid parts of the interior . . ."
- CARD, F. W. (4144)
WIND-BREAKS. *Nebr. Agr. Expt. Sta. Bull.* 48, pp. 69-96. 1897.
"The most prominent beneficial tendencies of wind-breaks on the western plains are to conserve moisture during the growing season by checking the evaporation from soils and plants . . . A beneficial effect of less importance in the West is the tendency to hold snow in place . . ."—Expt. Sta. Rec. 9: 354-355. 1897.
- CARLSON, A. D. (4145)
DUST BLOWING. *Harper's Mag.* 171: 149-158. July 1935.
The author, in outlining the settlement and development of the Midwest, indicates the various causes leading to dust storms and wind erosion in the "dust bowl." Overgrazing is discussed as a major factor.

- CARLSON, K. A. (4146)
WINDBREAKS FOR THE DRY FARM. Union. So. Africa Forest Dept. Bull. (1912)
7, 8 pp. 1913.
Planting of windbreaks from a careful choice of trees is urged; trees
suitable to the Orange Free State are listed.
- CARROLL, R. G. (4147)
SHELTER-BELT. Sat. Evening Post 208: 23, 81-85. October 5, 1935.
The plan to plant a forest 100 miles wide, along the one-hundredth merid-
ian from the Canadian border to the Rio Grande, has been transformed
into mixed tree planting in that portion of the Great Plains where climatic
and soil conditions make tree growth possible, and where such plantations
can benefit existing agriculture. This planting is described, and the
opinions of various authorities are quoted as to the usefulness and effec-
tiveness of it. Trees to be used in the shelterbelt project are listed.
- CAUFIELD, JOHN H. (4148)
THE DUST STORM SERVES NOTICE. Farm and Ranch 53: 2, 3, 9, illus. Septem-
ber 15, 1934.
An account of the ravages of wind in the Southwest and the recurring
drought situation is discussed. "An American Sahara is in the making
unless the windblown soil of eight or ten Western States is again tied
down with grass roots." The author urges that grass be planted as a
preventive, and contrasts American methods with the Italian soil-conserva-
tion program.
- CHAPMAN, H. H. (4149)
SHELTERBELT PROJECT; DIGEST OF OPINIONS RECEIVED ON THE SHELTERBELT PROJ-
ECT AND INDIVIDUAL LETTERS RECEIVED. Jour. Forestry 32: 952-991. De-
cember 1934.
- CHARLES, F. E. (4150)
TREES THAT CAN TAKE IT. Successful Farming 33: 10-11, illus. February
1935.
Shelterbelt trees that will combat biting winds and help prevent the
recurring tragedies of drought and dust are suggested.
- CHEYNEY, EDWARD G. (4151)
ESTABLISHMENT, GROWTH AND INFLUENCE OF SHELTERBELTS IN PRAIRIE REGIONS
OF MINNESOTA. Minn. Agr. Expt. Sta. Bull. 285, 36 pp., illus. 1931.
The author classifies the benefits of shelterbelts under several heads:
Protection from hot, dry winds of summer, and cold winds of winter; pro-
tection to man, livestock, orchards, and field crops; a saving in fuel and an
increased sale value for the farm. Species suitable to various sections of
Minnesota are recommended.
- CHILCOTT, E. F. (4152)
PREVENTING SOIL BLOWING ON THE SOUTHERN GREAT PLAINS. U. S. Dept.
Agr. Farmers' Bull. 1771, 29 pp., illus. 1937.
Implements used in preventing soil blowing are described. "The best
preventive and control of soil blowing on cultivated land consists in keeping
on the surface materials such as crops, crop residues, or clods, that resist
soil movement." Regrassing and shelterbelts of trees and shrubbery are ad-
vocated.
- CHITTENDEN, A. K. (4153)
WINDBREAKS. Mich. Agr. Expt. Sta. Quart. Bull. 2: 88-89. 1919.
"Jack pine, Scotch pine, and Austrian pine are specially recommended
for windbreaks on sandy soil, as they have fairly compact root systems,
will not sap the soil under adjacent fields, and make a rapid growth."—
Expt. Sta. Rec. 42: 547. 1920.
- CHOUN, H. F. (4154)
DUSTSTORMS IN THE SOUTHWESTERN PLAINS AREA. U. S. Monthly Weather
Rev. 64: 195-203, illus. June 1936.
The author verifies the seriousness and severity of soil erosion due to
wind, but also shows that total abandonment of the area is not imminent

or necessary. He suggests selective tilling of some of the area and use of the remainder for grazing purposes. A table giving data on dust storms at Amarillo, Tex., from 1933 to 1936 is supplied.

CLARK, E. R. (4155)

A PRELIMINARY REPORT OF THE GROWTH AND EFFECTIVENESS OF WINDBREAKS IN THE HIGH PLAINS AREA OF OKLAHOMA. Okla. Panhandle Sta. Panhandle Bull. 55: 3-12, illus. 1934.

"Observations on windbreaks planted in 1928 around the station orchard and watered only at the setting indicated that Chinese elm, apricot and Russian mulberry may be successfully grown in the Panhandle region. Osage orange and red cedar made slow progress, and all the pines succumbed. In the fall of 1934 the elm, apricot, and mulberry trees averaged 11.6, 8.9, and 8 ft. in height, and wind-velocity measurements showed that the trees were effective in reducing the wind for a distance of 260 feet. Records in the various plats showed that soil moisture was an outstanding factor in tree behavior."—Expt. Sta. Rec. 72: 628. 1935.

CLOTHIER, G. L. (4156)

FOREST WINDBREAKS AS A PROTECTION TO THE LIGHT SOILS OF THE COLUMBIA RIVER BASIN. Wash. State Col. Ext. Pub. Ser. 1, No. 4; 13 pp., illus. 1914.

Benefits from the use of forest windbreaks are listed. "The protective influence of a windbreak extends from ten to twenty times its height, the protection extending farther as the velocity of the wind increases. Low growing windbreaks to be efficient must occur more frequently than tall." Questions involved in successful tree planting on the light soils of the Columbia Basin are discussed.

COMPTON, W. (4157)

GOVERNMENT VERSUS DESERT: THE FALLACY OF THE SHELTER BELT. Forum 93: 237-239. April 1935.

The writer derides the shelterbelt project extending from Canada to Mexico. Restoration of American forests already existing is advocated rather than experiments in forest making. "Forests don't make water—they conserve it, store it, and distribute it. They do not make it or prevent it."

COOK, I. C. H. (4158)

WIND BREAKS, WATER PLUGS AND HONEY BEES. Rural New Yorker 96: 507. July 3, 1937.

States that forest denudation has driven bees to seeking refuge in abandoned houses and water towers, or plugs. Advises the restoration of forests, windbreaks, and orchards.

CORWIN, E. P. (4159)

PREVENTION OF WIND DAMAGE ON SANDY LANDS BY THE USE OF RYE. Iowa State Hort. Soc., Rept. (1934) Ann. Conv. 69: 331-335. 1935.

The soil on Muscatine Island is cited as an example in discussing wind damage. "The land on this island was very fertile when first broken. For a number of years it retained quite a lot of the humus that is in all new ground, but eventually this disappeared and the sand and soil began to blow, damaging crops, in fact blowing them entirely out of the ground. About thirty years ago those who could afford it, planted evergreens, Scotch pine, cedars and osage hedge around their fields. The general manner of controlling sand at the present time, is in sowing rye."

CROSS, W. (4160)

WIND EROSION IN THE PLATEAU COUNTRY. Bull. Geol. Soc. Amer. 19: 53-62, illus. 1908.

In the introduction the author states that he is convinced by recent observations that the great plateau country of the western part of the United States is one of the provinces in which the effective degrading or denuding agency of the wind has not been fully appreciated. "The facts on which this belief rests will be presented in the order in which they were observed." He discusses eolian soil in Colorado, the plateau country east of the Grand River Canyon, Utah, and deflation in Dry Valley.

DANIEL, A. D., AND LANGHAM, W. H.

(4161)

THE EFFECT OF WIND EROSION AND CULTIVATION ON THE TOTAL NITROGEN AND ORGANIC MATTER CONTENT OF SOILS IN THE SOUTHERN HIGH PLAINS. *Jour. Amer. Soc. Agron.* 28: 587-596, illus. 1936.

Presents experimental procedure and results of experiments to determine change in total nitrogen and organic-matter content of soils as affected by wind erosion and cropping. States that "the drift had an average of 24.5 percent less organic matter and 28.0 percent less nitrogen than the virgin soil. The data indicate that each time a soil is shifted more plant nutrients are removed, and that after being moved a large number of times, the dunes from soils that are dispersed by the wind finally became sand, regardless of the original texture . . . Since the total nitrogen and organic matter in the soil profile decreases rapidly with depth, the data clearly prove the great necessity for retaining the surface soil." Accompanied by tables.

DEN UYL, DANIEL.

(4162)

PROTECTIVE WINDBREAKS INCREASE FARM COMFORT. *Purdue Agr.* 28: 37, 41, illus. February 1934.

Describes the many advantages of windbreaks and shelterbelts and gives data on planting. A table gives figures on the effect of a pine and spruce windbreak on wind velocities.

SHELTERBELTS FOR MUCK LAND. *Purdue Agr.* 30: 64, 74, illus. March 1936.

Data are given on the proper location and planting of this type of shelterbelt. Discusses the adaptabilities of green and golden willows and the evergreens, American arborvitae and Chinese arborvitae.

THE ZONE OF EFFECTIVE WINDBREAK INFLUENCE. *Jour. Forestry* 34: 689-695. July 1936.

"During the past five years the Purdue University Agricultural Experiment Station has been engaged in a study of windbreak influences. Automatic recording instruments, including wind velocity recorders and hydrothermographs, have been used in obtaining approximately 130,000 hours of records on wind velocity, temperature and relative humidity. The results presented in this paper are based on these records and deal only with the influence of windbreaks on wind velocities."

DISTERDICK, F. L.

(4165)

SEVERE SAND STORM IN EASTERN WYOMING. *U. S. Monthly Weather Rev.* 61: 16-17. January 1933.

An exceptionally severe wind and dust storm occurred on January 18, 1933. "The small particles of soil, consisting largely of decomposed granite, were caught up and some of it carried to great heights . . . Large windrows of sand were formed and many ditches filled."

DOLLEY, M. D.

(4166)

EVIL EFFECTS OF DRIFTING SANDS ALONG THE JERSEY COAST. *N. J. Forester* 1: 6-7. January 1895.

A brief history of forest destruction in the Danish island of Seeland and of southwestern France after the passing of natural forests from government control to private ownership. The author points out similar conditions on Long Island where farmers "complain that the sand borne inland by the wind increases from year to year upon their fields, and threatens to bury entire farms in the course of time. The people of South Jersey have much to learn in the matter of reclaiming drifting sands and sand waste, but the sowing of coarse seeds and grasses, such as sea sand-reed and rye grass, is one of the first steps." For later planting, myrtle bushes, pines, cedars, junipers, and poplars are recommended.

DRAKE, R. R.

(4167)

WIND EROSION AND ITS CONTROL. *Agr. Engin.* 18: 197-198, 200, illus. May 1937.

The author states that disastrous wind erosion in the future may be prevented throughout the Great Plains if proper land-use practices are employed where conditions indicate that soil blowing is likely to occur.

DRAKE, R. R.

(4168)

WIND EROSION CAN BE CONTROLLED BY PROPER TILLAGE OPERATIONS. U. S. Dept. Agr. Yearbook 1935: 342-344, illus. 1935.

This article describes the factors contributing to wind erosion and describes methods of tillage for use with continuous wheat.

DRUMMOND, W. I.

(4169)

DUST BOWL; SHORT GRASS COUNTRY—WHERE DRY YEARS AND HIGH WINDS SPEED THE ERRANT SOIL AND ONLY NATURE CAN BRING RELIEF TO STOUTHEARTED DUST BOWL FARMERS. Review of Reviews 93: 37-40, illus. June 1936.

An account of the dust bowl before and after the soil was weakened by overgrazing and overproduction. Control projects are reviewed. "Soil fertility is not lost through wind erosion to the extent that it is through water erosion. It is merely shifted around."

DULEY, F. L.

(4170)

WIND EROSION IN THE GREAT PLAINS. The Land, Today and Tomorrow 2: 5-8, illus. April 1935.

The author discusses soil blowing in Kansas and recommends several methods of control.

EDMONDSON, W. C.

(4171)

PLANTING AND CARE OF SHELTERBELTS IN WYOMING. Wyo. Col. Agr. Ext. Cir. 27, 24 pp., illus. 1930, rev. 1933.

The advantages of a farm-forestry program are pointed out and description of a shelterbelt of broad-leaved and evergreen trees is given. Advice is given for preparation of ground, planting of young trees, pruning, mulching, protection from rabbits and livestock, and transplanting of pine trees.

ELLIS, J. H.

(4172)

SOIL-DRIFTING IN MANITOBA. Edmonton Meeting West. Canad. Soc. Agron. Proc., December 1920, 1: 38-48. August 1, 1921.

The writer describes the areas in Manitoba where soil drifting has occurred on a large scale. He outlines the causes and estimates the damage. Various control methods and policies are recommended.

EMERSON, J. L.

(4173)

INSTRUCTIONS FOR THE PLANTING AND CARE OF COOPERATIVE SHELTERBELTS AND WINDBREAKS ON THE CENTRAL GREAT PLAINS. U. S. Bur. Plant Indus. 21 pp. 1935. [Mimeographed.]

"The purpose of this publication is to present plans and to describe methods of planting and caring for trees in shelter-belt and windbreak plantations on the central Great Plains and also on the high plateaus and in the valleys and basins of western Wyoming and Colorado." The study is divided into three zones, zone 1, being western Wyoming and Colorado; zone 2, southeastern Wyoming, southwestern South Dakota, and northwestern Nebraska; and zone 3, southwestern Nebraska, eastern Colorado, and northwestern Kansas.

FAIRFIELD, W. H.

(4174)

SOIL-DRIFTING IN ALBERTA. Edmonton Meeting West. Canad. Soc. Agron. Proc., December 1920, 1: 35-37. August 1, 1921.

Discusses various control methods and emphasizes the fact that "it [erosion] is a community problem and must be handled, if it is to be handled successfully, in a community manner."

FARRELL, G. E.

(4175)

DUST, SOIL CONSERVATION, AND WHEAT. U. S. Agr. Adjustment Admin., March 22, 1937. 10 pp. Washington, D. C. 1937. [Mimeographed.]

An address prepared for delivery at a farmers' meeting, Dodge City, Kans. Discusses wind erosion in the Great Plains and the Southwest and proposes general conservation practices and policies. Stabilization of wheat acreage is discussed as a control measure. [Press release.]

FINNELL, H. H.

(4176)

CONTROL OF WIND EROSION ON THE SOUTHERN HIGH PLAINS. *The Land, Today and Tomorrow* 2: 4-6, illus. March 1935.

The author describes several phases of wind-erosion control and discusses work on the Dalhart soil-erosion-demonstration area.

(4177)

PREVENTION AND CONTROL OF WIND EROSION OF HIGH PLAINS SOILS IN THE PANHANDLE AREA. *Soil Conserv. Serv.* 13 pp. February 25, 1935. [Slightly revised April 1935.] [Mimeographed.]

This article recommends the following measures for the control of wind erosion: (1) Utilization of erosion-resisting residues; (2) moisture conservation for maintenance of vegetation; (3) emergency cover crops; (4) windbreak tree plantings; and (5) emergency tillage operations. Each method is described briefly.

(4178)

WHEN THE SOIL BLOWS. *Farmer-Stockman* 48: 9, illus. March 1, 1935.

The author recommends adequate vegetative cover for control of wind erosion in the semiarid high plains area.

(4179)

WHY TERRACE ON THE HIGH PLAINS? *Farmer-Stockman* 50: 3, 23, illus. February 1937.

The farmers on the High Plains of north Texas and adjoining counties in Oklahoma and New Mexico must combat wind and keep the soil in place. This problem is discussed with reference to the wind-erosion-control project at Dalhart, Tex. A plan "to conserve the moisture to grow vegetation; conserve the vegetation to save the soil" is set forth.

(4180)

WINDBREAKS IN WIND EROSION CONTROL. *Jour. Forestry* 33: 693-694. July 1935.

"While the control of wind erosion is largely an agronomic problem involving the utilization of erosion-resisting crop residues, moisture conservation for the continuation through drought of the vegetative cover, the use of emergency cover crops, and as a last resort the employment of certain tillage methods, all within cultivated fields, no opportunity should be lost to supplement such a program by permanent border vegetation in the form of trees." Hardy species of trees for the southern high plains area are the Russian mulberry, apricot, Chinese elm, honeylocust, Russian-olive, green ash, cottonwood, desertwillow, and tamarix.

(4181)

WIND EROSION CONTROL AND ITS EFFECT ON A PLANNED AGRICULTURE. 6th Southwest Soil and Water Conservation Conf., Tyler, Tex., Proc., pp. 51-53. 1935.

"The discussion of the relations indicated by this subject will be based on the assumption that a planned agriculture gives full consideration to the purpose of utilizing the natural resources of every region in the most highly efficient manner possible . . ." The essential features of a permanent system for wind erosion control designed to cover all emergencies are crop-residue conservation, water conservation, cover-crop planting, tillage methods, windbreaks, and shelterbelt tree planting.

FITCH, C. L.

(4182)

WHAT THE WIND DID LAST SPRING AND WHAT THE WIND MAY DO TO THE LAKEBED VEGETABLE BUSINESS. *Iowa State Hort. Soc. Rept.* 1934: 315-328, illus. 1934.

The wind "blew away the topsoil in some cases to the depth of the plow sole which means it moved up to six or even eight inches of earth, the very best dirt we had, off from our fields, and off from our farms, never to come back again . . . I am one of those men who believe that these lands properly protected and properly furnished with buildings and drainage, windbreaks, machinery, knowledge, and skill and character will be worth \$500 per acre." The planting of rows of trees east to west as windbreaks is advocated and illustrated.

FLY, C. L.

(4183)

A PRELIMINARY REPORT OF THE CHEMICAL AND MECHANICAL ANALYSIS OF DUST DEPOSITED BY WIND AT GOODWELL, OKLAHOMA. Okla. Panhandle Agr. Expt. Sta. Bull. 57: 11-15. 1935.

"Results of the analyses reported above show that wind erosion may deplete the total fertility of a soil by sifting out the lighter and more fertile portion and carrying it away . . ." The author offers the compensating factor that soil removal from one field may deposit it upon another but "not as much soil will be returned to a given field as is carried away by winds and that a steady drain upon the fertility of the High Plains soils will continue until wind erosion is checked by protective vegetative covering and proper tillage practices."

FORD, R. E.

(4184)

TREE WINDBREAKS FOR COLORADO. Colo. Agr. Col. Ext. Bull. 326-A, 23 pp., illus. 1933.

A plan for planting windbreaks, including soil preparation, is presented. Broad-leaved and conifer trees are recommended, and a table on shade-tree insect pests and methods of control is given.

FREE, E. E.

(4185)

THE MOVEMENT OF SOIL MATERIAL BY WIND, WITH A BIBLIOGRAPHY OF EOLIAN GEOLOGY BY S. C. STUNTZ AND E. E. FREE. U. S. Bur. Soils Bull. 68, 263 pp., illus. 1911.

This bulletin brings together, correlates, and summarizes important data on eolian geology from the viewpoint of a soils student. Main subjects dealt with are: Wind translocation, drifting sand and sand dunes, dust storms and dust fall, the continued drift of soil material with the wind, true atmospheric dust, geologic formations of eolian origin, and volcanic dust as soil material. The bibliography forms a fairly complete index to the study of eolian geology "especially of deflation and those other phenomena closely connected with the subject-matter of the bulletin."

—AND WESTGATE, J. M.

(4186)

THE CONTROL OF BLOWING SOILS. U. S. Dept. Agr. Farmers' Bull. 421, 23 pp., illus. December 22, 1910.

The authors discuss normal movements of the soil, causes of excessive blowing, control of soil blowing, suitable cropping systems, methods of cultivation, soil moisture, artificial protectors, blowing of sandy soils, blowing of newly cleared lands, miscellaneous problems such as protection of irrigation ditches, embankments, and roads, and devices for the control of drifting sands.

GARREN, G. M.

(4187)

OVERCROPPING WITH PEANUTS OR TREATMENT OF "BLOWING SOILS." Tex. Agr. Col. Ext. Bull. 40, 7 pp. 1917.

The loose sandy soils, commonly known as "blow sands", of west-central Texas are discussed. "The fundamental remedy . . . is incorporating vegetable matter with the soil and leaving coarse trash on the surface of the field from the harvesting of one crop till the planting of the next. The customary method of harvesting peanuts neither puts humus in the soil nor leaves trash upon the surface. Hence it is absolutely necessary to grow peanuts in some sort of rotation upon this type of soil when the usual methods of harvesting are followed." Two examples of successful farming on blow sands are cited.

GEORGE, ERNEST J.

(4188)

GROWTH AND SURVIVAL OF DECIDUOUS TREES IN SHELTERBELT EXPERIMENTS AT MANDAN, NORTH DAKOTA, 1915-34. U. S. Dept. Agr. Tech. Bull. 496, 48 pp., illus. 1936.

"Seven trees only have maintained satisfactory growth and survival. They are Chinese elm, green ash, boxelder, chokecherry, Siberian pea-tree, buffaloberry, and American plum."

Literature cited, page 48.

- GILBERT, G. K. (4189)
LAKE BASINS CREATED BY WIND EROSION. *Jour. Geol.* 3:47-49. 1895.
A description of small lakes in a district in the Arkansas Basin where they were abundant in 1893-94. The writer believes the lake basins in question were created by the action of the wind and gives reasons for this conclusion, the lack of vegetation being one.
- GORRIE, R. M. (4190)
GREAT PLAINS SHELTERBELT PROJECT. *Empire Forestry Jour.* 14:37-42, illus. July 1935.
"The idea of a gigantic strip of forest stretching from north to south across the treeless Prairie States of the Middle West does, of course, appeal to everyone's imagination . . . A feature which such a project emphasizes is the interdependence of forestry with the other forms of land use, and this is a point of view which other foresters as a whole would do well to assimilate from the United States foresters, many of whom have got this broad outlook well developed."
- GREEN, S. B. (4191)
FARM WIND-BREAKS AND SHELTER-BELTS, THEIR FORMATION AND CARE. 69 pp. St. Paul. 1906.
A simple manual on the subject of prairie planting for protection of buildings and crops. The kinds of trees, methods for planting to form efficient windbreaks and shelterbelts, with instructions as to suitable trees for certain soils and their cultivation, are given. A section on the propagation of plants, with a table showing the approximate height of 1-year-old seedlings grown on good average soil, is included. The various ways in which trees can be injured and methods for protection are described, as well as the cultivation of nursery stock.
- GREENFIELD, GEORGE. (4192)
NEW YORKER IS AWED AND SHOCKED IN THE FOG OF A DUST BOWL STORM. *N. Y. Times* 86: 1, 2, illus. March 8, 1937.
An account of a 200-mile ride from Kansas City to Denver. The devastation of wind erosion and resultant desolation and abandonment of farms and homes in the "dust bowl" are described. The author also discusses the health hazards undertaken by those who live in the wind-swept, dust-laden Midwest.
- GRIFFITHS, R. L. (4193)
WIND EROSION OF SOILS IN THE AGRICULTURAL AREAS. *So. Aust. Dept. Agr. Bull.* 317, 16 pp., illus. 1936.
Discusses the causes of erosion, the importance of rotation cropping, controlled grazing, and cultivation practices to control erosion. The control of wandering sand dunes is given consideration; blue lupine, evening-primrose, marram grass, buffalo grass, and kudzu are recommended. Data on growing trees for windbreaks also are given.
- H., J. G. (4194)
WHAT CAUSES SOIL DRIFTING? *Dakota Zephyr* 2: 8-9. March-April 1936. [Mimeographed.]
Briefly explains connection between humus impoverishment of soil and soil drifting or blowing.
- HAFENRICHTER, A. L., AND WANSE, H. M. (4195)
WIND EROSION ON THE SUMMER FOLLOWED WHEATLANDS OF THE WEST. *Soil Conserv.* 1: 8-10. August 1935.
This article points out the sharp line of demarcation between prevention and control of wind erosion. "It is easier, more practical, and more economical to prevent wind erosion than to control it."
- HAGELIN, VERNON. (4196)
FARMS THAT BLOW AWAY. VEGETATION RECLAIMS DRIFTING SAND. *Prairie Farmer* 108: 4, 30, illus. April 25, 1936.
Describes the little deserts of northwestern Illinois and states that with soil conservation methods and financial aid, farmers are planting soil-binding plants and trees to reclaim them.

- HANSEN, ROY.** (4197)
 SOIL-DRIFTING IN SASKATCHEWAN. Edmonton Meeting West. Canad. Soc. Agron. Proc., December 1920, 1: 49-59, illus. August 1, 1921.
 Presents data on erosion damage in nine localities of Saskatchewan and lists resolutions passed by the Better-Farming Congress at Swift Current affecting erosion-control policies for the Province. Describes the work of a commission appointed to deal with these resolutions and discusses methods of control.
- HARRINGTON, F. M., AND MORGAN, GEO. W.** (4198)
 DRY-LAND SHELTER-BELT TESTS AT THE NORTHERN MONTANA BRANCH STATION. Mont. Agr. Expt. Sta. Bull. 235, 16 pp., illus. 1930.
 This study of shelterbelt planting introduces several important lessons for future work. Important data on planting arrangements are shown in a table.
- HAZEN, LESLIE EUGENE.** (4199)
 BLOWING SOILS. U. S. Bur. Plant Indus. Bull, 130: 51-53. 1908.
 Describes experiments conducted at the agricultural experiment station at Hays, Kans., with and without vegetation, harrowed and unharrowed, etc., to determine the resistance of soil in various conditions to wind erosion.
- HERBERT, P. A.** (4200)
 SAND BLOW PLANTING. Mich. Agr. Expt. Sta. Quart. Bull. 5: 198-199. May 1923.
 A brief description of experimental sand-blow control in the Haarlem sand-blow area.
- HIBBS, B.** (4201)
 REAPING THE WIND. Country Gent. 104: 15, 45-48. May 1934.
 Wind erosion in the Southwest and the destruction of topsoil by wind are discussed. The damage by wind during the spring and summer of 1933 is described. Proper tillage, lister ridging, restoration of grasslands, and other control measures are discussed, and cooperation among farmers is urged.
- HOPKINS, E. S., BARNES, S., PALMER, A. E., AND CHEPIL, W. S.** (4202)
 SOIL DRIFTING CONTROL IN THE PRAIRIE PROVINCES. Canad. Dept. Agr. Bull. 179 (n. s.), 39 pp., illus. 1937.
 Soil drifting is traced back to 1887 by the authors. "During the years from 1931 to 1934 soil drifting assumed such serious and widespread proportions and caused such tremendous damage to farm property that more definite action towards effective and permanent control has become imperative." This bulletin offers information on how to control drifting. Wheat yields, acreages cropped, summer fallow, and total annual precipitation data are presented in tabular form, pages 30-39.
- HUNTINGTON, E.** (4203)
 MARGINAL LAND AND THE SHELTER BELT. Jour. Forestry 32: 804-812. November 1934.
 "Professor Huntington first gave public expression to his appraisal of the Shelter Belt Project at the recent annual meeting of the Society for the Protection of New Hampshire Forests . . . His remarks, coming from a recognized authority on economic geography made a profound impression on his audience, including a number of professional foresters, and created a demand to see them in print. It is in response to that demand that the following article is offered to the Journal's readers." Introduction.
- IRELAND DEPARTMENT OF AGRICULTURE AND TECHNICAL INSTRUCTION.** (4204)
 FORESTRY: PLANTING, MANAGEMENT, AND PRESERVATION OF SHELTER BELTS, HEDGEROW, AND ORNAMENTAL TIMBER. Ireland Agr. and Tech. Instr. Leaflet 70, 6 pp. (Dublin). 1919.
 "In a country swept by westerly gales with such frequency as Ireland, the successful breeding and feeding of livestock greatly depend upon the artificial or natural shelter afforded by buildings, shelterbelts, or hedgerow timber through the winter months . . . Besides acting as wind-

breaks, trees provide shaded air spaces in hot, sunny weather, and . . . tend to reduce the temperature and increase the circulation of air on a still day." The form and position of shelter trees are discussed, and a list is given of the principal species suitable for planting as shelter against wind, for ornament, and for hedgerows.

- ISAAC, E. E. (4205)
PLANTING AND CARE OF SHELTER BELT TREES. Mont. Agr. Col. Ext. Cir. 15,
4 pp. 1931.

Methods of planting and cultivation are described.

- (4206)
SHELTER BELTS FOR MONTANA. Mont. Agr. Col. Ext. Bull. 109, 16 pp., illus.
1930.

"Any person owning a farm in Montana, either dry land or irrigated, may file an application for trees for a wind break, shelter belt, or wood-lot planting for that farm." Instructions on location, size, preparation of ground, species, and methods of planting are given.

- JARDINE, W. M. (4207)
MANAGEMENT OF SOILS TO PREVENT BLOWING. Jour. Amer. Soc. Agron. 5: 213-
217, illus. October-December 1913.

The author gives data as to the frequency and velocity of windstorms in Kansas. He illustrates various methods to control soil blowing, and describes the implements best suited for farming operations on wind-blown lands. Demonstrations by farmers in cooperation with the Kansas Agricultural College prove beyond doubt "that the soil of the Great Plains area can be held in place . . . by the use of the lister . . . and adapted tillage implements."

- JOEL, ARTHUR H. (4208)
SOIL CONSERVATION RECONNAISSANCE SURVEY OF SOUTHERN GREAT PLAINS WIND-
EROSION AREA. U. S. Dept. Agr. Tech. Bull. 556, 68 pp., illus. 1937.

This report deals primarily with erosion resulting from destruction of vegetative cover or by some activity of man. Causes of accelerated erosion, analysis of erosion data, and types and degrees of erosion are discussed. Tabular data relating to dust storms, climate, agricultural statistics, and erosion are included.

- JONES, EWING. (4209)
DUST STORMS THROUGH THE YEARS. The Land, Today and Tomorrow 2: 1-4,
illus. April 1935.

A discussion of dust storms in the Middle West and their relation to soil erosion.

- JONES, H. A. (4210)
EFFECT OF DUST ON THE MELTING OF SNOW. U. S. Monthly Weather Rev.
41: 599. April 1913.

At the Wagon Wheel Gap Experiment Station, Colo., during the night of March 18-19, 1913, "a 2-quart pan packed full of snow showed, after the snow had melted, about an eighth of an inch of sediment on the bottom of the pan . . . it was evident the dust had come across the Continental Divide from the desert plains of New Mexico . . . The melting season was nearly a month in advance of the normal . . . and much of this advance is attributed to the presence of the dust blanket."

- JULIEN, A. A. (4211)
EROSION BY FLYING SAND ON THE BEACHES OF CAPE COD. N. Y. Acad. Sci.
Ann. 14: 152-153. 1902.

An abstract of Julien's paper, in which "he described the physical characteristics of the beach sand of Cape Cod, and showed them to be in general derived from the Tertiary formation and from the glacial sands and gravels . . . The sand movement under the influence of the wind is extensive, and many results of erosion by moving sand are seen in the wearing of cliffs and in the pitted surfaces of the pebbles on the beaches. The author showed also that the sand grains suspended in the air are subjected to rapid erosion from mutual impact, and thus that sand particles

too small to be eroded in water are much comminuted when dry, and set in motion in the air. This fine resulting silt is carried and deposited as fine mud."

KEET, J. D. M. (4212)

REPORT ON DRIFT SANDS IN SOUTH AFRICA. So. African Dept. Agr. and Forests Bull. 172, 41 pp., illus. 1936.

Results of the survey of drift sands, origin, principles underlying reclamation and recommendations are discussed in the first part of the report. Notes on methods employed in fixing drift sand in South Africa are given in appendix C, pages 32-34.

KELLOGG, CHAS. E. (4213)

SOIL BLOWING AND DUST STORMS. U. S. Dept. Agr. Misc. Pub. 221, 11 pp., illus. 1935.

The author attributes the great dust storm of 1934 not only to the drought of that year but also to "the cumulative effect of deficiency of rainfall of several preceding years." Control measures such as tillage, windbreaks, and strip farming are prescribed.

KENETY, W. H. (4214)

WINDBREAKS FOR MINNESOTA PRAIRIE FARMS. Minn. Farmers Inst. Ann. 33: 149-160, illus. 1920.

Lists of suitable trees, for various counties of Minnesota are given, as well as general information relative to the establishment, maintenance, and value of windbreaks.

KETES, C. (4215)

COMPETENCY OF WIND IN LAND DEPLETION. U. S. Monthly Weather Rev. 45: 57-58. February 1917.

"Of the three titanic powers of erosion ever at work leveling and lowering the face of the earth the wind receives least and last attention. Yet, as an agent of general denudation, the wind is actually . . . perhaps on the whole more competent than all others combined." The author says that the "dust storm" or "sand storm" is in reality as much a transportative agent as a river, and that wind is responsible for more general erosion than is rain or any other agency.

KING, F. H. (4216)

DESTRUCTIVE EFFECTS OF WINDS ON SANDY SOILS AND LIGHT SANDY LOAMS, WITH METHODS OF PROTECTION. Wis. Agr. Expt. Sta. Bull. (1894-95) 42, 29 pp., illus. 1895.

"There are extensive areas of light sandy loam, or sandy loam soil in Wisconsin well adapted to certain crops especially potatoes, on which crops are subject to serious injury by parching winds and drifting soil . . . The means recommended for reducing the injury are frequent rotation in long, narrow strips of land, running as a rule at right angles to the direction of prevailing winds; use of an abundance of organic manures; leaving the ground rough after seeding; clearing woodlands in belts at right angles to prevailing winds, and planting windbreaks."—Expt. Sta. Rec. 6: 622. 1894-95.

KIRSCH. (4217)

ON REFORESTATION OF THE DUST BELT IN THE MID-WEST. Amer. Met. Soc. Bull. 17: 333-334. November 1936.

Excerpts from a letter to A. C. Lane, Cambridge, Mass. "Even a forest belt to be erected on the windward side of the zone which is to be protected would be more efficient if it were irregularly interrupted. A forest is not only a means of water preservation and holding down the soil, but it is also a means of influencing the air flow up to heights of several thousand meters."

LAKE, E. R. (4218)

A WORD ABOUT WINDBREAKS. Wash. Agr. Expt. Sta. Bull. 3: 60-63. 1892.

The author states that some of the advantages of windbreaks are protection from cold; lessening of evaporation from soil and plants; lessening of windfalls; lessening of liability to mechanical injury of trees; retention of snow and leaves; protection to blossoms from severe winds; enabling

trees to grow more erect; lessening of injury from the drying up of small fruits; hastening maturity of fruits in some cases; encouragement of birds; and ornamentation.

- LAW, A. H. (4219)
THE "DUST BOWL" COMES BACK. INTELLIGENT EFFORT WILL PRESERVE GREAT PLAINS PRODUCTIVENESS. *Farm and Ranch* 55: 1, 10, illus. February 15, 1936.
A general discussion of the four major achievements in high plains wind-erosion control for 1935.
- LONGYEAR, B. O. (4220)
WINDBREAKS AND SHELTER BELTS FOR THE PLAINS. *Colo. Expt. Sta. Bull.* 123: 15-17. 1908.
Instructions for the construction and location of windbreaks and shelter belts are given.
- MACDONALD, GILMOUR B. (4221)
RENEWING THE SHELTERBELT. *Iowa Agr. Expt. Sta. Cir.* 27, 16 pp., illus. 1916.
"By following any one of the methods described in this circular the old stand of trees may be cut out and a new stand of the same or some other species secured while keeping the shelterbelt in a more or less effective condition." Trees adapted for planting are listed.
- MAIDEN, J. H. (4222)
REMARKS ON THE SAND-DRIFT PROBLEM. *Agr. Gaz. N. S. Wales* 11: 12-18. January 1900.
"A brief report is given on the attempts which have been made to prevent the drifting of sands in two portions of New South Wales . . . A list of shrubs and trees suitable for seaside planting is given, together with brief notes as to their relative value; also several grasses valuable as sand-binders."—*Expt. Sta. Rec.* 12; 319. 1900.
- MARKLEY, M. C. (4223)
THE PROBLEM OF WIND EROSION. *Northwest Miller* 189: 15, 24, illus. March 31, 1937.
Discusses soil blowing in Gaines County, Tex. Strip cropping is described and recommended as a control measure.
- MARTIN, R. J. (4224)
DUST STORMS OF JANUARY-APRIL 1937 IN THE UNITED STATES. *U. S. Monthly Weather Review* 65: 151-152. April 1937.
Contains extracts from a letter describing a trip through a portion of the dust bowl. "Severe soil erosion occurred in some southeastern districts of Colorado during this month [February 1937], and most wheat, and even buffalo grass, suffered . . . March and April brought the most extensive dust-storms that have prevailed in recent months . . . The dust-fall at Fort Collins, Colo., was estimated at 420 tons per square mile."
- (4225)
DUST STORMS OF MAY 1936 IN THE UNITED STATES. *U. S. Monthly Weather Rev.* 64: 176. May 1936.
Notes areas experiencing light, dense, and severe dust storms during May 1936. "In portions of Minnesota seeded fields were damaged where grain was not high enough to keep the soil from being blown away . . ." Colorado had severe dust storms. "In parts of Baca County heavy dust was reported blowing from fields an hour or two after rainfalls of one-half inch or more."
- MATHEWS, O. R. (4226)
RESULTS OF FIELD CROP, SHELTERBELT, AND ORCHARD INVESTIGATIONS AT THE UNITED STATES DRY LAND FIELD STATION, ARDMORE, S. DAK., 1911-32. *U. S. Dept. Agr. Cir.* 421, 48 pp. 1937.
The agricultural history of the section is given together with results of field-crop, farm-orchard, and shelterbelt investigation, the latter made for the purpose of determining the species of trees and methods of planting

and care suitable for the section. "Selection of hardy species and arrangement so that snow is trapped and held in the shelterbelt are requisite to the successful growth of a shelterbelt." Laurel, willow, boxelder, green ash, northwest poplar, American elm, and the Siberian pea-tree are among those used.

MATTICE, W. A., COMP. (4227)
DUST STORMS. U. S. Monthly Weather Rev. 63: 113-115, illus. March 1935.

Extracts from reports of section centers show the intensity and seriousness of the dust. "An encouraging feature of these storms is the fact that the major soil blowing seems to have been confined to a relatively small portion of the agricultural area [Texas Panhandle] of the country."

(4228)
DUST STORMS, NOVEMBER 1933 TO MAY 1934. U. S. Monthly Weather Rev. 63: 53-55, illus. February 1935.

The Weather Bureau circularized its stations east of the Rocky Mountains to obtain detailed reports of this and other similar storms, the reports being summarized in this article. "These extracts from station reports are intended to show the approximate maximum spread of dust from day to day."

METCALF, W. (4229)
INFLUENCE OF WINDBREAKS IN PROTECTING CITRUS ORCHARDS. Jour. Forestry 34: 571-580, illus. June 1936.

It is estimated that it pays to devote 10 percent of the orchard area to windbreak trees and to spend \$15 per orchard acre for windbreak maintenance. The author also discusses wood lattice frames for protecting new orchards while windbreak trees are getting established.

MILLER, H. (4230)
WHEN BITING DUST SWEEPS ACROSS THE LAND. N. Y. Times Mag., pp. 6, 20, 22, illus. April 11, 1937.

A description of a visit to the West and a drive through a dust storm in the Middle West. The plowing up of the prairies was a Nation's mistake and is now a Nation's problem. Grass must be replanted. The sod restored—but the problem of what to do with the population of these dusty acres remains.

MORGAN, M. F. (4231)
SOIL FACTORS IN RELATION TO PROPOSED PLAINS SHELTER BELT PLANTINGS. Jour. Forestry 33: 137-138. February 1935.

The author discusses soils included in the two major pedologic groups of the proposed shelterbelt. "As a result of soil and topographic variation within the shelter belt there are undoubtedly many areas which present soil moisture conditions sufficiently favorable for the growth of a tree species which is adapted to withstand long periods of soil desiccation."

MOSS, H. C. (4232)
SOME FIELD AND LABORATORY STUDIES OF SOIL DRIFTING IN SASKATCHEWAN. Sci. Agr. 15: 665-679, illus. June 1935.

"The soil series referred to in the following pages may be placed in four groups, each group consisting of soils having similar textural ranges and parent materials, but occurring in different zones." This paper is primarily concerned with wind erosion, but water erosion in southern Saskatchewan is also considered.

NEW MEXICO COLLEGE OF AGRICULTURE AND MECHANIC ARTS, AGRICULTURAL EXTENSION SERVICE. (4233)

WIND EROSION PROGRAM CLOSES. DRY LAND COUNTIES OF STATE ADOPT CONTOUR TILLAGE AS CONTROL PRACTICE. N. Mex. Ext. News 17: 1. July 1937.

The author analyzes the emergency wind erosion control program, which started in March 1936 and ended July 1937, and which has proved successful in dry-land counties of New Mexico. "Nearly two million acres have been farmed on contour lines . . . and it is safe to say that this practice is so well established that farms in eastern New Mexico will continue to follow it in the future years."

NEW MEXICO COLLEGE OF AGRICULTURE AND MECHANIC ARTS, AGRICULTURAL EXTENSION SERVICE. (4234)

WIND EROSION PROGRAM REOPENS. N. Mex. Ext. News 16: 1, illus. December 1936.

In 14 counties in the dry-land area with the same general policies prevailing, the emergency wind erosion control program has been reopened. Annual reports of county extension workers show that the acres listed on contour lines were trebled over previous years.

NEW MEXICO STATE PLANNING BOARD. (4235)

WIND EROSION. Prog. Rept. to [U. S.] Natl. Resources Bd. pp. 72-74. 1935. [Mimeographed.]

This report, in discussing the sandstorm of March 15-16, 1935, in eastern New Mexico, states: "Marginal land purchases of these wind erosion districts should be pushed to discourage attempts at crop farming and to bring the eroded lands under government or state control." The different types of land subject to wind erosion are described.

O'BRIEN, M. P., AND RINDLAUB, B. D. (4236)

THE TRANSPORTATION OF SAND BY WIND. Civ. Engin. 6: 325-327, illus. May 1936.

Experiments to discover the relationship between wind velocity and weight of sand transported. Graphs show typical sieve analyses of beach sands at the mouth of the Columbia River, wind velocity gradients during typical runs, and relation between wind velocity and rate of sand movement.

PALMER, A. E. (4237)

THE CONTROL OF SOIL DRIFTING. World's Grain Exhib. and Conf. Proc., Regina, Canada, 1: 442-449, illus. 1933.

In recommending control methods for wind erosion the author describes crop rotations, windbreaks, cover crops, and strip farming.

(4238)
THE SOIL DRIFTING PROBLEM IN THE PRAIRIE PROVINCES. Sci. Agr. 16: 264-265. January 1936.

The author, who is connected with the Dominion Experimental Station for southern Alberta, in Canada, presents "his own conception of certain phases of the soil drifting problem," in a paper read before the soils group of the Canadian Society of Technical Agriculturists at the University of Alberta, Edmonton, June 25, 1935. Not examined.

PANFILOV, J. (4239)

O KONSTRUKTSII LESNYKH POLOS. Na Lesokulturnom Fronte, nos. 7-8, pp. 2-18. [Moscow] 1932. [Translation in U. S. Forest Serv., Div. Silvics, Transl. 228].

Results of observations are presented on the influence of forest walls of different directions upon the development of tree and other seedlings. The author contends that shading explains "the low yield of fruit trees adjacent to shelterbelts, and the small crops of vegetables growing under fruit trees in orchards, etc." Construction of shelterbelts which do not shade adjacent fields is described. Accompanied by literature citations.

PLOGHE, J. S. (4240)

OUT OF THE DUST. Christian Cent. 52: 691-692. May 22, 1935.

A description of the dust storms in Kansas. "Despite dust storms, drought, crop failures and depression the people of the great plains region are neither defeated nor discouraged . . . They have no thought of abandoning the country . . ." Methods of fighting erosion are described, and the question of submarginal lands is considered.

POGUE, J. E. (4241)

A POSSIBLE LIMITING EFFECT OF GROUND WATER UPON EOLIAN EROSION. Jour. Geol. 19: 270-271. April-May 1911.

Attention is called to some suggestions regarding the effect which ground water, existing under a special condition, may have upon erosion.

PURDUE UNIVERSITY, DEPARTMENT OF AGRICULTURAL EXTENSION. (4242)

TEN POINTERS ON TREE WINDBREAKS. Purdue Agr. Ext. Leaflet 189, 4 pp., illus. 1934.

These pointers are discussed under benefits, location, preparation of site, spacing of trees, types of windbreaks, planting stock, planting, protection of plantations, and growth.

POTNEY, BRYANT. (4243)

RECONSTRUCTION IN THE DUST BOWL. Editorial Research Repts. 2: 91-108. August 3, 1937.

This pamphlet is divided into four parts: (1) The new attack on the wind-erosion menace, namely the coordinated program of the Department of Agriculture; (2) causes of distress in the dust bowl, such as unregulated settlement of the southern Great Plains, overstocking, land-tenure system, and soil erosion; (3) proposed methods of reconstruction; and (4) progress of Federal and State programs, including the Federal emergency wind-erosion-control program and recent State soil conservation districts laws.

RAMSEY, G. R. (4244)

EVERGREEN WINDBREAKS FOR IOWA FARMSTEADS. Iowa Agr. Col. Ext. Cir. 217, 32 pp., illus. 1936.

Practical information is presented on planting and maintaining shelter belts for the control of wind erosion.

REAGAN, A. B. (4245)

THE BLOWING OF SOILS. Science (n. s.) 28: 653-654. 1908.

Discusses observations on the effects of wind erosion in Iowa, New Mexico, Arizona, South Dakota, and Washington. In conclusion the author states: "Various means have been adopted to prevent the movement of soil by winds. The Moqui Indians do not plow their soil at all. They simply dig a hole in the sand for each hill of corn and then tramp down the dirt with their feet to keep it from blowing away. Many people in the southwest do not plow their land until the windy season is over. And in the irrigated regions the ground is flooded as soon as plowed. To prevent the movement of soil by wind as well as to level the land, the farmers of the Plains region roll their land or crush it with a weighted plank float."

REYNOLDS, F. S. (4246)

PREVENTS SOIL BLOWING. West. Farm Life 38: 7. June 15, 1936.

Relates experience in planting corn and beans in small strips to keep soil from blowing on a nonirrigated farm in Colorado.

RILEY, J. A. (4247)

SANDSTORMS IN TEXAS. U. S. Monthly Weather Rev. 59: 30-31, illus. January 1931.

Sandstorms in Texas are of three distinct types. The writer discusses type, velocity, and density and compares them to similar storms in the Egyptian Sudan.

ROBINSON, W. A. (4248)

THE "BROWN" SNOWFALL IN NEW HAMPSHIRE AND VERMONT. Science 83: 596-597. June 19, 1936.

Presents mechanical and chemical analysis of colloidal matter in brown snow sample from Wells River, Vt., collected during the brown snow fall of February 24, 1936, and discusses the origin of various soil constituents found to occur in the snow.

ROLFE, DEETE. (4249)

UNUSUAL DUST STORMS IN ILLINOIS. Geog. Rev. 17: 324-325. April 1927.

A description of the wind and dust storms in Illinois on June 6 and 7, 1926, an unusual experience in that part of the country.

RULE, GLENN K. (4250)

EMERGENCY WIND-EROSION CONTROL. U. S. Dept. Agr. Cir. 430, 11 pp., illus. February 1937.

The writer suggests control measures to the farmer by saying: "(1) He can protect stalk, stubble, and pasture fields from being overgrazed or burned; and (2) he can have his unprotected fields roughened before the

soil starts drifting." The lister and chisel cultivator are recommended for protective cultural operations. Emergency tillage as a temporary measure is discussed. "Water is the key to wind-erosion on the Great Plains. Soil moisture helps to insure vegetation, and vegetation, in turn, is the only permanent control against wind erosion."

RUSSELL, R. D.

(4251)

THE MINERAL COMPOSITION OF ATMOSPHERIC DUST COLLECTED AT BATON ROUGE, LA. Amer. Jour. Sci. (5) 31: 50-66. January 1936.

"Dust samples collected from two dust storms passing over Baton Rouge on April 12, 1934, and April 11, 1935, are described and compared. The mineral composition of the samples is given, with percentage determinations on grains larger than 0.01 mm. diameter."

RUSSELL, R. J., AND RUSSELL, R. D.

(4252)

DUST STORM OF APRIL 12, 1934, BATON ROUGE, LA. U. S. Monthly Weather Rev. 62: 162-163. May 1934.

One of the most severe dust storms on record in the South. Weather conditions and a description of the dust are given.

SABIN, D. R.

(4253)

SOIL BLOWING IN WYOMING. Wyo. Agr. Col. Ext. Cir. 46, 7 pp., illus. 1933.

Practices that may lessen soil blowing on lands planted to spring crops are suggested with recommendations for handling bare fields in winter and seeding down old fields to perennial grasses.

SANFORD, F. H.

(4254)

PROGRESS IN SAND BLOW CONTROL. Mich. Agr. Expt. Sta. Quart. Bull. 1: 130-131. February 1919.

A brief description of experimental work in sand-blow control in Ottawa County under the supervision of the county agent, with the assistance of the forestry department of the agricultural college.

SEARS, P. B.

(4255)

GREAT AMERICAN SHELTER-BELT. Ecology 17: 683-684. October 1936.

"The entire problem of modern civilization is emerging into its true light, as a vast, ecologically conditioned enterprise . . . at the start it is emphasized that shelter-belt planting can only represent one aspect of a comprehensive land management policy, and that its benefits must come from local amelioration rather than any influence on climate as such. The Great Shelter-Belt project clearly exemplifies the strength and weakness of our modern technological culture." Discussing the area the author says, "No Chinese wall of forest, but a combination of field-plantings, wind-breaks, and some block-planting is recommended, all with due regard to soil topography and water supply." Close spacing, diversity of composition, and a stream-line top contour are recommended.

(4256)

O, BURY ME NOT OR, THE BISON AVENGED. New Repub. 91: 7-10. May 12, 1937.

Discusses the condition of the High Plains or short-grass country, where the "dust bowl" has its center, and the work of the Forest Service in shelterbelt planting.

SILCOX, F. A.

(4257)

THE FOREST SHELTER BELT. Junior Red Cross Jour. 2: 37-39, illus. October 1934.

The drought-relief project of a forest shelterbelt 100 miles wide and extending more than 1,000 miles across the Great Plains from the Canadian border to Texas is described. "It is to combat these new, partly man-made conditions that President Roosevelt specified that drought relief should include measures to limit wind erosion and to conserve water by restricting cultivation, extending the grass areas, and planting protective forest strips. Man can not change the cosmic forces of the solar system, but he can modify his own surroundings. This has been proved by reforestation of the Karst, near the Mediterranean Sea; of the lands in southern France and of the sand hills of Nebraska, all of which are striking examples of the conquest of man over the inimical forces of nature."

SIMMONS, E. F.

(4258)

DRIFTING SOIL. Nebr. Farmer 49: 431. April 20, 1910.

A farmer relates his experience with sandy land in Dundy County, Nebr. He disked his ground once, and sometimes twice and three times, and had successful crops. But when he followed the teachings of Campbell and disked his land in early spring, a terrific wind rose and swept the rolling portion of 75 acres as clear as a roadbed and as deep as it had been cultivated. A great percentage of the seed was not disturbed but failed to thrive afterwards in spite of various measures he took to help it. He asks for advice and remedy. In an editorial note it is stated that "farmers who have sandy land must handle it as carefully as they would handle a delicate piece of china." Advice is given to remedy the situation.

SINGLETON, R. C.

(4259)

ONE DAY PLUS ONE HOUR. Mont. Farmer 23: 3, 31. May 15, 1936.

Advises planting of *Caragana* hedges for field shelterbelts in northwest prairie sections and suggests a plan by which each farmer may devote 1 day per year per quarter section of land to planting trees crosswise of the prevailing winds in an effort to prevent soil blowing.

SLOAN, S.

(4260)

SOIL BLOWING AND ITS CONTROL. Mont. Farmer 21: 5. July 15, 1934.

One inch of topsoil removed from a farm amounts to from one-fourth to one-sixth of the soil to ordinary plow depth. "This layer in approximate figures would contain plant food equal to the amount removed from the soil by 20 crops of wheat, each yielding 50 bushels to the acre." Methods of control vary with local conditions such as soil type and cropping systems; but "in areas where soil-blowing has become chronic it is necessary to adopt some method that will actually prevent the soil from drifting . . . Strip-farming is the only practical method so far developed." The advantages and disadvantages of strip farming are summarized.

SMITH, W.

(4261)

TREES STOP DRIFTING DOLLARS. Successful Farming 35: 26, 97, illus. April 1937.

"Just how much value to put upon shelter from midwestern winds has been the object of investigation among 340 farmers in 26 Nebraska counties . . . At least \$326 annual saving per farm was their answer." Experiences with tree windbreaks and shelterbelts are cited.

SPAFFORD, W. J.

(4262)

THE CONTROL OF DRIFTING SAND. So. Aust. Dept. Agr. Jour. 32: 700-709. March 15, 1929.

The writer discusses the causes of sand drifts, methods of farming sandy lands to prevent drift, controlling surface drifts, and the measures to be taken in growing sand-binding plants from seed or by transplanting them. He lists a number of plants that can be used as windbreaks.

STAMM, H. K.

(4263)

THE ACTION OF THE WIND AND ITS SIGNIFICANCE IN AGRICULTURE. Internat. Mitt. Bodenk. 3 (1): 50-66. 1913. [Abstract in Rev. Sci. [Paris] 51, 11 (12): 367-370. 1913.]

"This is a discussion of the subject based upon a report by Free and Stuntz (E. S. R. 25 p. 424), emphasizing especially the means which may be adopted to reduce the damage done by wind erosion."—Expt. Sta. Rec. 29: 811. 1913.

STARRING, C. C.

(4264)

ENDURING WINDBREAKS THAT WILL REDUCE WIND VELOCITY. Mont. Soil Conserv. 1: 6. April 1936.

Presents planting plan for trees and shrubs in windbreak for best results in reduction of wind velocity and ground shade. Planting arrangement is given in tabular form.

- STOWE, E. (4265)
ON THE EFFECT OF WIND-DRIVEN SAND AS A CUTTING AGENT. Roy. Soc. New Zeal. Trans. 5: 105-106. 1873.
A description is given of the cutting action of a long bank of fine sea sand, at the mouth of the Waikato River, on blocks of pumice brought down by the waters of the river from the interior of the country.
- THOMAS, E. L. P. (4266)
ORNAMENTAL AND WINDBREAK TREES AT GROOTFONTEIN. Farming in So. Africa 9: 111. March 1934.
Eucalyptus, pine, cypress, and other varieties of windbreak trees are listed.
- THROCKMORTON, R. I. (4267)
DUST STORMS; THEIR CAUSE AND SUGGESTED REMEDIES. Engin. News-Rec. 114: 669-671, illus. May 9, 1935.
The author analyzes the seriousness and severity of dust storms and endeavors to refute news pictures and sensational reports that irreparable devastation of vast areas is imminent. He finds that only small areas have been permanently impaired and believes that an end to the prolonged drought and institution of farming practices that take account of annual high winds will restore and stabilize the Great Plains and make living both tolerable and profitable.
- TOWNSEND, T. L. (4268)
THE DRIFT OF A SOIL-DRIFTING CONFERENCE. Nor'-West Farmer 53: 5, 26. June 1934.
Discusses a conference on wind erosion in Regina, Saskatchewan. The opinions of heads of various Dominion experimental farms are given.
- TRENK, F. B. (4269)
WINDBREAKS AND SHELTERBELTS FOR MARYLAND. Md. Univ. [Agr.] Ext. Bull. 42, 35 pp. 1927.
"Northwesterly, westerly, and southwesterly, are the winds chiefly concerned in this discussion, and this knowledge will be of value later, when we discuss the matter of planting and developing the most efficient windbreak." Factors affecting the efficiency of windbreaks and shelterbelts are discussed, and in considering the establishment of a proper windbreak a "tabular key for windbreak planting" is presented.
- UDDEN, J. A. (4270)
DUST AND SAND STORMS IN THE WEST. Pop. Sci. Monthly 49: 655-664. September 1896.
- (4271)
THE MECHANICAL COMPOSITION OF WIND DEPOSITS. Augustana Libr. Pub. 1, 69 pp. 1898.
"Samples of different kinds of materials moved by the wind have been collected from different places of desposition [deposition] and from the atmosphere directly for this study." The author places these materials into four categories: (1) Lag gravels; (2) drifting sand; (3) fine sand; and (4) dust.
- UNION OF SOUTH AFRICA, DIVISION OF FORESTRY (4272)
ANNUAL REPORT . . . FOR THE YEAR ENDED MARCH 31, 1936. Union So. Africa, Div. Forestry, 47 pp., illus. 1936.
Various references are made in this report to efforts of the Union of South Africa Government to control erosion, particularly drifting sands.
- UNITED STATES BUREAU OF PLANT INDUSTRY. (4273)
INSTRUCTIONS FOR THE CARE OF SHELTERBELTS AFTER PLANTING. U. S. Bur. Plant. Indus. Off. of Dry-Land Agr., 4 pp. 1919. (Revised, 1930.)
"The following instructions are given to shelter-belt cooperators to assist them in obtaining the best results with their plantings." General topics—cultivation, pruning, fencing, control of insect pests, and equipment.

UNITED STATES EXTENSION SERVICE.

(4274)

CUSHIONING THE WIND IN NEW MEXICO. FARMS AIDED BY EMERGENCY PROGRAM TO CONTROL WIND EROSION. U. S. Ext. Serv. Rev. 7: 133-134. September 1936.

The value of contour furrowing for checking wind erosion and for the conservation of moisture is stressed by the writer. "Two million dollars was allotted to check losses from wind erosion in the southern Great Plains area. New Mexico, one of the states in this area, is making great progress in slowing up the movement of soil with the wind."

(4275)

EMERGENCY PROGRAM AIDS WIND-ERODED STATES. U. S. Ext. Serv. Rev. 7: 118. August 1936.

Funds for an emergency program were made available to the southern Great Plains area by an act of Congress approved February 29, 1936. The campaign started early in March. The States of Colorado, Kansas, New Mexico, Oklahoma, and Texas are cooperating in this work which calls for the listing of 8,252,585 acres of land subject to wind erosion.

UNITED STATES FOREST SERVICE, LAKE STATES EXPERIMENT STATION

(4276)

POSSIBILITIES OF SHELTERBELT PLANTING IN THE PLAINS REGION. U. S. Forest Serv., Lake States, Expt. Sta. 201 pp., illus. Washington, Govt. Print. Off. 1935.

The main headings in this publication are: The Problem, by F. A. Silcox; What The Study Discloses (A Summary of Findings and Recommendations), by Raphael Zon; Prospective Effects of the Tree-Planting Program, by Raphael Zon; Economic and Social Aspects of Agriculture in the Plains Region, by M. L. Wilson; Soil and Forest Relationships of the Shelterbelt Zone, by F. A. Hayes and J. H. Stoeckeler; The Native Vegetation of the Region, by J. M. Aikman; Ground-water Conditions of the Shelterbelt Zone, by G. E. Condra.

VISHER, S. S.

(4277)

CLIMATIC EFFECTS OF THE PROPOSED WOODED SHELTERBELT IN THE GREAT PLAINS. Ann. Assoc. Amer. Geogr. 25: 63-73, illus. June 1935.

"The following discussion is concerned chiefly with the probable climatic effects of the proposed belt. It is written by one who has spent years within the proposed zone and several additional years a few miles east of it. The especial basis for its discussion is, however, a somewhat extended study of the influences affecting climate of the past and present." The author's conclusion is that the proposed shelterbelt is not justified climatically.

VUREN, J. P. J. VAN

(4278)

THE PROBLEM OF WIND-ERODED LANDS. Farming in So. Africa 12: 108-109, 125, illus. March 1937.

Causes, results, and preventive measures for wind erosion in the Orange Free State and the Transvaal, Union of South Africa are discussed.

WAHLBERG, H. E.

(4279)

PROTECTING THE ORCHARD AGAINST WIND. Calif. Cult. 82: 733, 757. December 7, 1935.

The need for protective windbreaks is pointed out by means of a table presenting financial results from orchards with and without windbreaks. "In 1933 . . . the windbreak protected orchards returned \$90 more per acre than did the unprotected orchards. The average total returns on the former were \$229.64 per acre and on the latter \$137.68 per acre." Planting suggestions and advice on careful management are given.

WALDRON, C. B.

(4280)

WINDBREAKS AND HEDGES. N. Dak. Agr. Expt. Sta. Bull. 88, 11 pp., illus. 1910.

"The profit derived from tree-planting is not measured wholly by the timber supply. Trees may be profitably planted to prevent the washing away of soil on hillsides, the forming of gullies across the land . . . The primary object of tree-planting in North Dakota has been and should be for protection." Advice on planting windbreaks and hedges is given with choice of trees suitable for different sections.

- WALLACE, H. A. (4281)
SAND ON THE MARCH. 5 pp. Washington, D. C. 1937. [Mimeographed.]
Remarks of the Secretary of Agriculture, broadcast in the National Farm and Home Hour, April 27, 1937. The soils carried by the dust storm of February 1937, from the Panhandle of Texas, western Oklahoma and and Kansas into Iowa and Michigan showed by analysis that "typical virgin topsoil of that area which has not been harmed by the wind contains about one percent of organic matter. When the wind works on it, the soil which is left contains only one-third as much organic matter. Fortunately, we are developing soil defense measures that, properly and patiently applied, may preserve us from such waste and ruin; but we have made a late beginning; . . . Can we stop these troubles and keep the soil from marching, the deserts from growing? I believe we can, if we will."
- WARREN, J. A. (4282)
AGRICULTURE IN THE CENTRAL PART OF THE SEMIARID PORTION OF THE GREAT PLAINS. U. S. Bur. Plant Indus. Bull. 215, 42 pp., illus. 1911.
Presents practical data on dry-farm management in the Midwest. The construction of windbreaks is treated, page 38.
- WATT, A. S. (4283)
STUDIES IN THE ECOLOGY OF BRECKLAND. II. ON THE ORIGIN AND DEVELOPMENT OF BLOW-OUTS. Jour. Ecology 25: 91-112, illus. February 1937.
"In Breckland's vegetational and soil history wind erosion has played and still plays an important part. Broadly two kinds of erosion may be distinguished. The first, demonstrated on any dry windy day in March or early April by the drift of sand from newly tilled fields, may be described as frontal; in this type the causal winds blow more or less straight or direct. In the second type the causal winds are cyclonic: the erosion is local and a wind-furrow or blow-out is formed." The article is a discussion of causes and effects of wind-blown sand. "No blow-out can be formed where there is a continuous cover of higher plants stabilizing the soil. The opportunity is presented only where degeneration of the plant communities takes . . . place."
- WESTVELD, R. H. (4284)
TREE WINDBREAKS FOR MISSOURI FARMS. Mo. Agr. Col. Ext. Cir. 343, 7 pp., illus. 1936.
Directions are given on location, spacing, and arrangement of shelterbelts. Information is also given on selecting species and caring for the windbreak.
- WHITFIELD, C. J. (4285)
WIND EROSION ENDANGERING COLORADO VEGETATION. The Land, Today and Tomorrow: 27-28, illus. December 1934.
This article describes the problem of erosion in eastern Colorado.
- WILSON, M. L. (4286)
WIND EROSION FOUGHT IN A UNIFIED PROGRAM. N. Y. Times 84: 10E. April 28, 1935.
"Temporary programs can contribute something to the development of permanent programs for arresting soil erosion, and it is on the permanent programs that emphasis is being placed by farmers and the technically trained agriculturists of the Southwest dust-storm region . . ." The work of the Federal and State erosion-control agencies is described.
- WILSON, R. (4287)
PLANTING AND CARE OF SHELTER BELTS ON THE NORTHERN GREAT PLAINS. U. S. Dept. Agr. Farmers' Bull. 1603, 13 pp. 1929.
"Experiments conducted since 1916 in cooperation with nearly 2,000 farmers have demonstrated that shelter belts of trees for the protection of farm buildings, gardens, and orchards can be grown successfully on the Northern Great Plains. The purpose of this bulletin is to present the plans, practices, and methods that have been found successful in these experiments."

WILSON, R., AND COBB, F. E. (4288)

DEVELOPMENT OF COOPERATIVE SHELTER-BELT DEMONSTRATIONS ON THE NORTHERN GREAT PLAINS. U. S. Dept. Agr. Bull. 1113, 27 pp., illus. 1923.

"To show the possibility of planting trees for shelter belts and to demonstrate the proper methods of starting and caring for these plantings the Northern Great Plains Field Station near Mandan, N. Dak., in the development of one line of its work, has undertaken a cooperation with a number of farmers in the Northern Great Plains area. The main objects of the cooperation are to stimulate interest in the improvement of farm homes by planting belts of trees around the farm buildings and to determine by actual trial the species of trees best adapted to the different sections of the region."

WRIGHT, P. H. (4289)

CARAGANAS FOR HEDGES AND WINDBREAKS. Canad. Hort. 59: 249. November 1936.

Caragana arborescens, the Siberian pea-tree, is a most useful windbreak, hedge, and ornamental shrub. Uninjured by winter cold, it will survive rainless seasons in competition with the prairie sod and appears to be "one of the hardiest and generally toughest plants in existence."

WYATT, F. A., SMITH, J. MCG., NEWTON, R., AND GILLIES, C. C. (4290)

SOIL DRIFTING AND ITS CONTROL. Alberta Univ. Cir. 13, 26 pp., illus. 1932.

This circular is comprised of four talks on soil drifting, prepared in response to requests from farmers for information regarding methods of control. The articles are: Soil Types and Management in Relation to Soil Drifting, by F. A. Wyatt; The Influence of Machinery on Soil Drifting, by J. McG. Smith; Cropping Systems in Relation to Soil Drifting, by R. Newton; The Farm Nursery and Shelterbelt, by C. C. Gillies.

YEAGER, A. F. (4291)

SHELTERBELTS FOR NORTH DAKOTA. N. Dak. Agr. Col. Ext. Cir. 43, 7 pp., illus. 1921.

Plans for planting shelterbelts for farmstead protection are discussed. Locating the plantings and their size are considered.

ZON, RAPHAEL. (4292)

SHELTERBELTS—FEUDAL DREAM OR WORKABLE PLAN. Science 81: 391-394, illus. April 26, 1935.

Discusses the plan of "... a belt of forest trees stretching through the Great Plains from North Dakota to Texas ... The plan, as properly visualized, called for regimenting the trees into uninterrupted and undeviating parallel forest strips, 8 to 10 rods wide, rigidly spaced one mile apart, irrespective of topography, soil, or direction of prevailing winds."

SAND DUNES

ANONYMOUS. (4293)

HOLLIES ON NEW JERSEY DUNES. Forester 3 (10): 113, illus. October 1897.

The writer recommends the planting of beach hollies on sand dunes.

(4294)

HOLLY FOR DUNE PLANTING. Forester 3: 2. January 1897.

The writer recommends holly trees to check sand dunes moving inland on the Jersey coast near Avalon. "Holly grows under adverse conditions, forms an excellent shelter, and produces a clean white wood which is used in the manufacture of fancy articles."

(4295)

RECLAIMING SAND BARRENS. Forester 2: 26. March 1, 1896.

A survey is made of European sand barrens, turfs, and sand dunes, with results of 27 years' experiments in vegetative cover for reclamation. "The system of nurseries has proved a great success, their great value being that the plants are started in the same kind of soil into which they are to be transplanted, and exposures incidental to long transportation are avoided."

ANONYMOUS.

(4296)

THREE BOYS TACKLE EVEN THE SANDS OF THE SEA. Oreg. Farmer 60: 291, illus. May 13, 1937.

Describes the work of the Soil Conservation Service in controlling shifting sands from the sea which were destroying rich pastures in Clatsop County, Oreg. Methods used are picket fences, dunegrass plantings, and brush mats.

AUFRERE, LEON.

(4297)

CLASSIFICATION DES DUNES. Internatl. Geogr. Cong., Paris, 1931, Compt. Rend. 2 (1): 699-711, illus. 1933.

The author gives a geological classification of sand dunes, based on the origin of the sand. He continues by a climatic classification, based on the humidity of the earth and air, and as distinguishing dry dunes from wet dunes. A cyclo-dynamic classification of dunes forms the third part of the paper, and a short discussion follows.

BAKER, H. P.

(4298)

HOLDING AND RECLAMATION OF SAND DUNES AND SAND WASTES. Forestry Quart. 4 (3): 282-288. 1906.

Studies in dune movement and the extent and injury resulting therefrom are presented. Dune reclamation is recommended through planting of beach grass, sea lyme grass, and various species of conifers.

BENNEL, F. M.

(4299)

MAINE'S DESERT. Nature Mag. 30: 114-115, illus. August 1937.

The author tells the story of the "Little Sahara in America," made so by deforestation. Within the past 50 or 60 years about 300 acres of a farm near Freeport, Maine, has undergone a complete physical metamorphosis, sand dunes covering what was once fertile land. "Small trees have been completely covered, while the tops of the largest trees that are left protrude from the summits of the dunes and now present the appearance of bushes four to nine feet in height." The owner felled his large forest trees to supply wood for railroad engines.

CASE, G. O.

(4300)

COAST SAND DUNES, SAND SPITS, AND SAND WASTES. 162 pp., illus. London 1914.

"The object of this book is more particularly to draw attention to the advantages of collecting the inblown sand in the formation of a large coast protection dune, which when built up by the wind, under the guidance of man, to a proper height and inclination, serves several useful purposes . . . (1) such a littoral dune prevents inland sand drift and the formation of sand wastes; (2) it acts as an embankment or line of defense against erosion of the coast; (3) it enables, and makes it commercially worthwhile, to reclaim and convert into beautiful pine woods, any existing inland areas of sand wastes or useless belts of sand dunes only partially covered by vegetation." The use of marram grass and other suitable grasses and trees for the reclamation of sand wastes is discussed and illustrated. "The efficiency of vegetation for this purpose is not open to question." Many examples, both in the United States and Europe, are cited, among them the making of the Golden Gate Park at San Francisco.

COBB, C.

(4301)

WHERE THE WIND DOES THE WORK. Natl. Geogr. Mag. 17: 310-317, illus. 1906.

Sand reefs along the North Carolina coast with Cape Hatteras off Hatteras Island are the subject of this article. "The strong north winds pile the sands up into great barchanes or medanos, crescentic sand dunes known locally as whaleheads, which are moving steadily southward . . . The writer has found by experiment that heterogeneous sands, consisting essentially of quartz, orthoclase, some mica, iron, bits of shell, and many mineral substances, showing little if any decomposition, ripple readily in the wind and are easily arrested." He describes methods used, and the planting of trees and sand-binding plants and grasses.

- COLLINS, P. (4302)
SAND DEVASTATION. *Sci. Amer. Sup.* 83: 280-282 illus. May 5, 1917.
The author describes the advance of sand dunes and the checking of their movement through the use of marram grass, fir plantations, bent-grass tufts, and seaholly. "Certain maritime plants and grasses with spreading fibrous roots subserve a useful purpose in thus arresting and binding together the loose sand on the seashore." Measures employed in soil control on the Scotch coast, France, and on the coasts of the Netherlands and Denmark are cited.
- CORNISH, V. (4303)
ON THE FORMATION OF SAND DUNES. *Geogr. Jour.* 9: 278-309, illus. 1897.
The scope of this investigation of phenomena attending the making and distributing of pebble, sand, and dust, is described. "The plan of work adopted in the present research has been to deal first with the behavior of blown sand upon a manageable scale, and then to apply the results to the elucidation of the larger phenomena, which is the method of the experimental sciences. Further, I have kept the phenomena of waterways constantly in view, and as the research has progressed, I have been confirmed in the opinion that sand-dunes are best studied in conjunction with waves." The rippling of sand by wind, law of rippling by wind, the vertical section of dunes, the ground plan of dunes, and the action of obstacles are considered in turn.
- CRESSEY, G. B. (4304)
NOTES ON THE SAND DUNES OF NORTHWESTERN INDIANA. *Jour. Geol.* 30: 248-251. 1922.
Discusses investigations conducted to determine the effect of wind transportation on sand grains. Fifty samples were taken from the southern shore of Lake Michigan. Findings are in the form of generalizations due to the fact that "shifting winds render it impossible in some places to ascertain whether the sand at any given point has recently arrived or is part of the original material of the dune."
- FULLER, G. D. (4305)
PLANT COMMUNITIES OF THE DUNES ON THE SHORES OF LAKE MICHIGAN. *Sci. Monthly* 38: 444-451, illus. May 1934.
The use of trees and shrubbery to control shifting sands is discussed.
- GIFFORD, JOHN C. (4306)
THE CONTROL AND FIXATION OF SHIFTING SANDS. *Engin. Mag.* 14 (4): 603-614, illus. 1898.
"... the sandy coast-line of America, which is at present constantly changing, can be rendered practically stable by the application of forestry and engineering skill..." The author discusses the damage caused by shifting sands and the formation of dunes on the Atlantic coast and describes the construction and benefits of a protective or littoral dune, extending from the mouth of the Gironde River to Bayonne, in France.
- HILL, E. J. (4307)
THE SAND DUNES OF NORTHERN INDIANA AND THEIR FLORA. *Garden and Forest* 9: 353-354. 1896.
"The changes to which the dunes have been subjected at some period of their history help to explain one of the peculiar features of their flora and its mixed character." Plants are found here which seem to be out of place "but the principal reason for their presence in such places must be the supply of those elements favorable to their growth." The ever-shifting sands bury the vegetation and so provide organic matter for these plants; their roots are finely divided and run deep so that they are able to take moisture from the bases of the sand dunes which are saturated with water from lakes or neighboring sloughs.
- HITCHCOCK, A. S. (4308)
CONTROLLING SAND DUNES IN THE UNITED STATES AND EUROPE. *Natl. Geogr. Mag.* 15: 43-47, illus. 1904.
The writer was sent by the Department of Agriculture to investigate the methods used in Europe for controlling sand dunes. Work of this charac-

ter has engaged the attention of the various governments for over 50 years. "The fundamental principle of dune fixation is to cover the sand with a layer of any material which will prevent the access of the wind to the surface and thus prevent drifting." Preliminary methods of fixation are described.

- HITCHCOCK, A. S. (4309)
METHODS USED FOR CONTROLLING AND RECLAIMING SAND DUNES. U. S. Bur. Plant Indus. Bull. 57, 36 pp., illus. 1904.

"Much work has been done in controlling shifting sand dunes in Europe during the past century, and methods have been developed whereby it is possible to control the sand and in many cases to cover it again with vegetation . . . An outline of the methods that have been successfully employed in those countries is given in this bulletin, together with some other information of general interest concerning the subject of sand dunes."

- HOGBOM, IVAR. (4310)
ANCIENT INLAND DUNES OF NORTHERN AND MIDDLE EUROPE. Geogr. Ann. [Stockholm] 5: 113-243, illus. 1923.

"The present work has a twofold object: first, to present a survey of the ancient North and Middle European inland dunes, their regional distribution and their morphology; secondly, to inquire how far our views on the post glacial climatic development may be affected by such an exposition . . . In this treatise the dunes mainly have had to speak for themselves, and only incidentally I have brought their testimony in connection with observations of other than physics, geographical, or geological character."

- KROODSMA, R. F. (4311)
THE PERMANENT FIXATION OF SAND DUNES IN MICHIGAN. Jour. Forestry 35: 365-371, illus. April 1937.

The author describes in detail the methods and costs of stabilizing moving sand dunes.

- LA GORCE, J. O. (4312)
THE WARFARE ON OUR EASTERN COAST. Natl. Geogr. Mag. 28: 195-230, illus. September 1915.

Discusses shifting sand dunes and wind erosion along the coast line of the United States from the Virginia capes to the Rio Grande. The coast of New Jersey is also considered, showing how many acres have been reclaimed from the sea.

- LAMB, F. H. (4313)
THE SAND DUNES OF THE PACIFIC COAST. Forester 3: 94-97. August 1897.

The essential features of the sand dunes along the Pacific coast are described. "The problem to be solved in studying and reclaiming the sand dunes of Washington and Oregon is whether it is more expedient to construct littoral dunes and allow the enclosed area to become seeded with the native *pinus contorta*, or to reclaim it, as was done at Golden Gate Park, San Francisco, by the planting of lupines and other persistent herbaceous plants, followed by shrubs and trees."

- (4314)
SAND-DUNE RECLAMATION ON THE PACIFIC COAST. Forester 4: 141-142. July 1898.

The reclamation of sand dunes for the Golden Gate Park at San Francisco is described, and the methods followed are given. "The entire cost of reclamation by these methods does not average more than \$50 per acre."

- LAVER, C. G. (4315)
RECLAMATION OF DRIFT SANDS. Farming in So. Africa 11: 53-57, illus. February 1936.

Describes methods used in South Africa for the reclamation of coastal sands, including brushwood and wooden palisading barriers built one above another for the construction of a littoral dune of such a height that sand will not likely be blown over it. Grass and tree plantings for stabilizing sand areas are suggested.

- McLAREN, J.** (4316)
THE RECLAMATION OF DRIFTING SAND DUNES. *Forester* 5: 222-223. October 1899.
This paper gives details on sowing barley, shrubs, trees, and sea bent-grass to prevent sand from drifting.
- MADIGAN, C. T.** (4317)
THE AUSTRALIAN SAND-RIDGE DESERTS. *Geogr. Rev.* 26: 205-227, illus. April 1936.
A study of the Australian deserts in which the author traces the formation of longitudinal sand ridges from small beginnings, the ridges growing as insolation and disintegration provides the material. Includes various comparative descriptions, with topographical and vegetational data, of other deserts.
- MELTON, F. A.** (4318)
PARABOLIC, WIND-RIFT, AND LONGITUDINAL DUNES. (Abstract.) *Geol. Soc. Amer. Proc.* 1935: 91. 1936.
Discusses four types of wind-rift dunes: (1) simple ovoid, (2) progressive wind rift, (3) the retrogressive wind rift, and (4) a long straight wind rift between ridges.
- VEGETATION AND SOIL MOUNDS.** *Geogr. Rev.* 25: 430-433. July 1935. (4319)
"Vegetation without doubt plays an important part in guiding headward elongation of rivulets in many localities . . . The chief function of clump vegetation lies in directing the segmentation of residual soil strips by rivulets of secondary size. Although many examples could be shown of bushes forming the resistant nucleuses of hillocks, a greater number of such features probably exist without any protecting agent . . ."
- ROBINSON, C. H.** (4320)
THE SAND DUNES OF INDIANA. *Nature Mag.* 26: 81-84, illus. August 1935.
A discussion of the movement and vagaries of shifting sand along the southern shore of Lake Michigan. Native plants and vegetation are described.
- ROSS, L. W.** (4321)
THE EXPLOITATION OF THE SAND DUNES OF CAPE COD. *Forester* 3: 107-108, illus. September 1897.
A description of plantings for stabilizing the shifting sand of the "Province Lands" which now comprise about 3,200 acres. "About two-thirds of this area has become by the action of the northwest and northeast winds a bare barren track of wildly shifting sand hills." The cutting down and taking away of trees and shrubs, left the area undefended. Beachgrass, the seeds of various pines, several varieties of native oaks and other deciduous trees are being planted, and a considerable area is being planted with silver poplar and other large species to form wind-breaks.
- ROWALT, E. M.** (4322)
ANCHORING THE CLATSOP DUNES WITH VEGETATION. *Soil Conserv.* 2: 61-63, illus. October 1936.
This article describes the work of a Soil Conservation Service project at Warrenton, Oreg., to stop mobile sand dunes. This project was to "demonstrate measures of protection for other areas of the Pacific Coast similarly affected."
- SANFORD, F. H.** (4323)
MICHIGAN'S SHIFTING SANDS; THEIR CONTROL AND BETTER UTILIZATION. *Mich. Agr. Expt. Sta. Spec. Bull.* 79, 31 pp., illus. May 1916.
"This publication deals with the conditions found along the windswept shores of the great lakes and inland—wherever there is shifting sand. The study developed various facts which, if made use of, will assist owners of sand blows to formulate systems of control peculiar to their individual conditions . . . The object sought in this preliminary report is to secure uniformity of reclamation work."

SHEPHERD, FREDERICK.

(4324)

THE STORY OF THE DUNES. *Rocks and Minerals* 7: 41-48, illus. June 1932.

Discusses the characteristics and formation of sand dunes along Lake Michigan. Marram grass is described as one of the firmest of all sand-binding grasses.

STEVENSON, ELLEN B.

(4325)

THE DUNES OF THE MANISTIQUE AREA. *Mich. Acad. Sci. Papers* 14: 475-485, illus. 1931.

"This study of dunes was made in the Manistique section on the north shore of Lake Michigan . . . The major portion of the time was spent on the western section . . . The author states that the results here presented supplement the correlations of Cressey in the Indiana dune area.

STONE, G. H.

(4326)

WIND ACTION IN MAINE. *Amer. Jour. Sci.* (3) 31: 133-138. February 1886.

This article on shifting sand dunes in the Androscoggin Valley deals with ". . . two less common phases of wind action," namely, till burrowing and sand carving.

THOMPSON, W. O.

(4327)

ORIGINAL STRUCTURES OF BEACHES, BARS AND DUNES. *Geol. Soc. Amer. Bull.* 48: 723-751, illus. June 1, 1937.

"This paper presents, in detail, facts about original structures of modern beaches, bars, and dunes, and stresses especially their stratification. It attempts also to formulate criteria for recognition of ancient bars, dunes, and stratified beaches that lack organic remains, which might reveal the origin of the deposits . . . The writer spent nearly a year along the coast of California, between San Francisco and San Diego, examining various deposits, some of which are modern beaches, and others contain fossils indicative of ancient beaches. In addition, beaches and bars of lakes, as well as eolian deposits, were examined in many localities in the western states, as far east as Colorado."

TODD, J. E.

(4328)

RECENT WIND ACTION UPON THE LOESS. *Iowa Acad. Sci. Proc.* 1875-80. p. 21. 1880.

This paper was read at the fifth annual meeting of the Iowa Academy of Science. "An account of the formation of dust drifts, four feet in depth, during the spring of 1880, in southwestern Iowa. Similar conditions are supposed to account for the filling of ancient gullies which are frequently found, the rounded form of the loess hills, and the unusual height of certain bluffs near ancient bends of the Missouri River."

TOPLEY, W.

(4329)

SAND-DUNES AND BLOWING SAND. *Pop. Sci. Rev.* 14: 133-142. 1875.

The author describes the sand dunes on the coast of England and the Atlantic coast of Europe. "From the amount of calcareous matter which it contains, the sand often produces a fertile soil. At Cape Briton the dunes have been planted with vineyards for the last two hundred years." In discussing the dunes of Gascony the author says: "It is doubtful to what extent, if any, these and similar dunes were originally wooded. It has been supposed that during the time of the old forest growth they were covered with trees which have been mainly destroyed by man." The erosive action of sand is treated at length.

WESTGATE, J. M.

(4330)

RECLAMATION OF CAPE COD SAND DUNES. *U. S. Bur. Plant Indus. Bull.* 65, 38 pp., illus. 1904.

"For a century and a half beach grass has been utilized for sand-binding work upon the cape . . . but it was not until 1893 that the State of Massachusetts put in operation the present extensive system of reclamation . . . Since these operations are proving so successful and the methods developed there are applicable in a large measure to other similar areas in this country, the author was authorized to visit Cape Cod for the purpose of investigating the details of the work now in progress . . . The results of this investigation are presented in this bulletin."

- WHITFIELD, C. J. (4331)
SAND DUNES IN THE GREAT PLAINS. *Soil Conserv.* 2: 208-209, illus. March 1937.

The breaking down of sand dunes and their subsequent planting with suitable vegetation is the subject of this article.

- WILLEY, D. A. (4332)
SAND WAVES AND THEIR WORK. THE RAVAGE WROUGHT IN THE DESERT. *Sci. Amer. Sup.* 65: 113, 120-121, illus. 1908.

"The formation of sand hills or sand dunes along the Atlantic seacoast of the United States is so frequent that these eminences are common sights . . . An excellent opportunity has been given in the Columbia Valley to study the exact effect of wind currents blowing in different directions . . ." The writer discusses the erosive power of the wind, and some comparatively successful methods of checking the movement of sand.

WOOD LOTS

- ANONYMOUS. (4333)
FORESTRY AND SOIL CONSERVATION. *The Crier* 2 (2): 11-14. February-March 1936. [Mimeographed.]

Discussion of forestry in conjunction with soil conservation. Presents objectives of the Soil Conservation Service demonstrational woodland improvement program for Pennsylvania, with some practical directions for woodland maintenance.

- BARRETT, DEPRE. (4334)
ARTIFICIAL REFORESTATION IN GEORGIA. *South. Agr.* 67: 18, 30. October 1936.

Stresses importance of farm wood lots. "We believe . . . that conservation of our disappearing timber supply is a most serious question . . . Protection of the trees and accumulated organic matter is of prime importance to the welfare of the farmer."

- BEHRE, EDWARD. (4335)
THE PLACE OF FORESTRY IN THE NEW AGRICULTURAL CONSERVATION PROGRAM. *Jour. Forestry* 34: 674-681. July 1936.

"The new Agricultural Conservation Program, replacing the invalidated AAA may provide a major stimulant to farm forestry. This is of special significance in the Northeast, where farm woodlands constitute such an important element in rural economy." Soil conservation is not an end in itself, but it is essential as the basis for maintenance of economic productivity of the land resource. Address before Plant Science Club, Yale University, May 11, 1936.

- CLARKE, S. C. (4336)
FARM TREE PLANTING. *Idaho Agr. Col. Ext. Cir.* 46, 12 pp., illus. 1933.

Russian-olive and Siberian pea-tree are recommended for windbreaks and shelterbelts. Black locust has proved most satisfactory for wood-lot planting. Instructions are given for establishing windbreaks and wood lots.

- COPE, J. A. (4337)
GROWING WOOD AS A CROP ON NEW YORK FARMS, PT. 1. TREES AND PRODUCTS. *N. Y. Agr. Col. (Cornell) Ext. Bull.* 270, 38 pp., illus. 1933.

The author stresses the importance of wood lots as an integral part of the farm—an additional crop-producing unit. Classification of wood-lot species is given. Principal wood-lot crop as logs, mine props, poles, posts, and fuel are discussed.

- (4338)
GROWING WOOD AS A CROP ON NEW YORK FARMS. PT. 2. CARE AND CULTURE. *N. Y. Agr. Col. (Cornell) Ext. Bull.* 291, 44 pp., illus. 1934.

A continuation of Bulletin 270 (4337). The author discusses the steps necessary in handling trees so that they will produce more and better crops in less time.

- CRABB, P. W. (4339)
GROWS POSTS AND GRASS. *Capper's Farmer* 47: 39. October 1936.
The advantages gained in Benton County, Ark., by a farmer who planted black locust trees on a 2-acre plot of run-away hillside are described. Not only is the locust a legume and excellent soil builder, but it provides profitable material for posts and fuel.
- DEN UYL, D. (4340)
FARMWOODS SHOULD NOT BE PASTURED. *Purdue Agr.* 29: 73, 78, illus. May 1935.
"The farmer is interested primarily in his stock, when it comes to a decision between stock and woodlands. Hence the farmwoods has suffered from neglect, inattention, and carelessness. The forester naturally champions the cause of better forests and woodlots. Here we have a forester showing why it does not pay you financially to pasture your woodlots . . ."—Editor's note.
- DILLER, O. D. (4341)
SOIL MOISTURE CONTENT DURING CRITICAL PERIODS IN THE REGENERATION OF PREVIOUSLY GRAZED FARM WOODLANDS. *Jour. Forestry* 35: 399-402, illus. April 1937.
The results of this study covering one season of observation "are inconclusive, but they have served to establish a rather definite relationship between the very critical soil-moisture conditions which exist in the open grazed woodlands during the midsummer drouth periods and the repeated failure of natural regeneration in many of these areas."
Bibliography, pages 401-402.
- (4342)
WOODS STAGE COME-BACK. REASONABLE CARE SAVES WOODLANDS. *Ohio Farmer* 179: 4. January 2, 1937.
Describes work done on the author's 90-acre farm in northwestern Ohio toward the restoration of woodland to economic production and for wildlife preservation.
- FERGUSON, J. A. (4343)
PLANT SEED IN THE WOODLOT. *Pa. Farmer* 115: 135. September 12, 1936.
One cannot "continuously cut trees out of the woodlot and have the woodlot too." Directions are given for sowing the seed of trees in such manner that they may be safe from rodents.
- FERNOW, B. E. (4344)
FORESTRY FOR FARMERS. U. S. Dept. Agr. *Farmers' Bull.* 67, 48 pp. 1898.
Gives practical information to farmers who own small timber tracts or wood lots, or who wish to plant some part of their land to forest. The relation of farm forestry to soil conservation is discussed, pages 45-46.
- (4345)
THE RELATION OF FORESTS TO FARMS. U. S. Dept. Agr. *Yearbook* 1895: 333-340, illus. 1896.
The author shows the relation of forest conservation to soil-erosion control. In discussing the problems of the individual farmer, the utility of forest patches for farm use is considered.
- FIVAZ, A. E. (4346)
FARM WOODLAND: CONSERVER OF SOIL AND MOISTURE. *Soil Conserv.* 2: 28-29, 36-37, 40, illus. August 1936.
Discusses forest and farm wood-lot management for soil and moisture conservation.
- FONDA, MORRIS. (4347)
ONE FARMER'S PROFITS FROM BLACK LOCUST. *Soil Conserv.* 2: 101. November 1936.
The economic value of the black locust is proved in Gallatin County, Ill.

FRONTZ, LEROY.

(4348)

TREES FOR CASH AND CONSERVATION. Soil Conserv. 2: 212-213, 216, illus. March 1937.

"Properly managed and protected woodland on the farm has a definite place in proper land use and soil and water conservation. The landowner must be shown how the woodland cover may be maintained and at the same time made to produce revenue." The author relates the personal experience of a Muskingum County [Ohio] farmer, whose success was due to good management and effective land use, especially with regard to his woodland.

GIFFORD, J.

(4349)

THE FOREST IN RELATION TO THE FARM. Forester 2: 68-72. December 1896.

"The forest must be regarded as a crop which must be planted . . . A scarcity of forest products and an increase in population, in spite of low transportation rates for long distances, will soon render a conservative policy necessary, regardless of the beneficial effects of the forest on the community in many other ways. The richness of our virgin soils is due mainly to the detritus of the forest . . ." Planting of black locust, black walnut, white pine, white cedar, white oak, chestnut, and yellow pine is advocated.

JENKINS, M. B.

(4350)

TREES THAT CONQUERED THE PRAIRIE. Amer. Forests 43: 234-236, 251, illus. May 1937.

The story is told of J. J. Lydick, of Craig, Nebr., whose farmstead plantings have gained him national recognition and from whom the State of Nebraska obtained its concolor fir trees for the grounds of the 10 million-dollar State House. "Even during the drouth years of 1934 and 1936 not a single conifer was lost. The hardiness and present vigor of these plantings speak well for the wise selection of seed and choice of species." Among these species are Austrian pine, Douglas fir, white spruce, Black Hills and Colorado spruce, and ponderosa and limber pine.

JOHNSON, F. R., AND COBB, F. E.

(4351)

TREE PLANTING IN THE GREAT PLAINS REGION. U. S. Dept. Agr. Farmers' Bull. 1312, 32 pp., illus. 1923.

The purpose of this bulletin is to give information on the planting of various species of trees for farm use and protection. The subject of wind-break plantings to check wind erosion is given some consideration.

JOTTER, E. V.

(4352)

FARM WOODLAND IN SOIL CONSERVATION PROGRAM. Forestry News Digest, p. 21. January 1937.

The soil-prevention measures suggested include engineering operations, special methods of cultivation, rotation of crops, woodland management, establishment of windbreaks, retirement of steep and eroded land from cultivation and their conversion to permanent pasture or woodlands.

(4353)

FARM WOODLAND RETURNS. Soil Conserv. 2: 81-82, illus. October 1936.

"Today it is gratifying to note that along with the development of a program to control soil and moisture . . . there is increased recognition of the farm woodland." It is a generally recognized fact that "farm woodland is destined to become an increasingly important factor in the control of erosion and the rehabilitation of worn-out soils."

LAMB, G. N.

(4354)

FARM WOODLOT TIMBER; ITS USES AND PRINCIPAL MARKETS. Purdue Univ. Agr. Ext. Bull. 51, 24 pp., illus. 1916.

"It is the purpose of this bulletin to put before the Indiana farmer information that will help to increase the direct returns from the farm woodlot." Native commercial species and their uses are listed, with 16 marketing suggestions.

- MCCOMB, A. L., AND STEVENSON, H. A. (4355)
SOME NEW NURSERY EQUIPMENT. Jour. Forestry 34: 698-701, illus. July 1936.

Describes equipment consisting of two tractors, a seeder, a cultivator, and a digger used at the Soil Conservation Service nursery, Ames, Iowa. Factors influencing selection of equipment and its advantages are pointed out.

- MATTOON, W. R. (4356)
LARGE INCREASE IN FARM WOODLAND. Jour. Forestry 34: 917-918. October 1936.

During a 5-year period, 1930-35, wooded land on farms increased 23.7 percent, or 35,529,240 acres. This means that a little more than 1 acre out of every 6 on farms is in some kind of tree growth.

- MATTOON, WILBUR R. (4357)
GROWING BLACK LOCUST TREES. U. S. Dept. Agr. Farmers Bull. 1628, 13 pp., illus. 1930.

Advocates the use of black locust for erosion control in addition to its value as fence posts, stakes, poles, etc. Describes methods of planting, care, and cutting for greatest profit.

- MILLER E. E. (4358)
BLACK LOCUST RECLAIMS WASHED LANDS. Amer. Forestry 27: 252-253, illus. April 1921.

This tree has soil-building properties and is of rapid growth. The State of Tennessee furnished seedlings to plant demonstration areas. "The demonstration has been so convincing that farmers are beginning to take up the work themselves."

- MOORE, R. S. (4359)
TIMBER TREES FOR THE FARM WOODLOT. Calif. Cult. 83: 756-757. October 24 1936.

The value in soil conservation is estimated and suggestions for best varieties of trees for such use in California are made.

- MORRELL, F. (4360)
TREES OF THE OLD HOMESTEAD. MEMORIES OF A PRAIRIE WOODLOT. Amer. Forests 41: 110-111, 149, illus. March 1935.

"What do trees mean to prairie homes? Here is one answer—the most human of them all—for it deals with the lives of those who have lived and will continue to live in the plains region. Mr. Morrell's article was written almost ten years ago and printed in the December, 1926, number of Successful Farming. It is here reprinted because it portrays so intimately the human side of President Roosevelt's shelterbelt of trees for the Prairie States."—Editorial note.

- MOUNT, H. A. (4361)
IN THE WAKE OF THE WOODSMAN. Sci. Amer. 123: 122, 137, illus. August 7, 1920.

The need for forest protection and for reafforestation is the subject of this article. The example of China's deforested and sterile areas that once were fertile is cited. This deforestation is the cause of floods in the United States even as it is in China. The remedy is prevention, not only with regard to national forests but to farm wood lots. "The farmers own as large an area of woodland as the lumbermen and all others combined." The observation of Arbor Day by school children is extolled.

- MULFORD, FURMAN LLOYD. (4362)
TRANSPLANTING TREES AND SHRUBS. U. S. Dept. Agr. Farmers' Bull. 1591, 34 pp., illus. 1929.

"In the following pages an effort is made to present the essential factors for successfully moving trees and shrubs, without attempting to discuss conditions for continued success in their cultivation, their arrangement in garden, orchard, windbreak, forest plantation, or landscape, or the climatic range of their probable successful cultivation after being moved."

- NELSON, A. L. (4363)
SHELTER-BELTS AND FRUITS. Wyo. Agr. Expt. Sta. Bull. 179, 23 pp., illus. 1931.
"Trees can be grown on the plains of Wyoming under dry-farm conditions if given careful attention. Factors which are vital are the preparation of the soil, the kind of trees or shrubs, and the purpose for which they are planted . . . for the farmer or rancher who wishes to have a shelterbelt around his farmstead, a limited variety of fruits for home consumption and the beauty of yard plantings, this circular will show to some extent what has been observed at the Archer Field Station . . ."
- NEW HAMPSHIRE UNIVERSITY, EXTENSION SERVICE. (4364)
CONSERVATION PRACTICES FOR WOODLANDS. N. H. Univ. [Agr.] Ext. Cir. 196, 4 pp. [1937]
The author recommends seven softwood and eight hardwood species for forest planting. General data on planting are included.
- PARSONS, E. R. (4365)
PLANTING TREES AND SHRUBS ON THE PLAINS FARM. West. Farm Life 35: 3, 16, illus. October 15, 1933.
The benefits of tree plantings are described. Yellow pine and Russian-olive are especially recommended. The author presents data on the relation of spacing to water conservation.
- PICHA, B. (4366)
PLANT TREES TO PROTECT CROP, SOIL, AND YOUR INVESTMENT. Iowa State Hort. Soc. Rept. (1934) Ann. Conv. 69, pp. 333-336. 1935.
"In the interests of conservation of the soil resources and the welfare of the people engaged in deriving a living from peat land vegetable production, wind hazards must be eliminated or brought under control. Systematic tree planting offers the only known protection, is relatively inexpensive and easy to apply." Instructions for planting windbreaks are given.
- PRESTON, J. F. (4367)
THE PLACE OF THE FORESTER IN SOIL CONSERVATION. Soil Conserv. 2: 8-10, illus. July 1936.
This article stresses the necessity for making the farmer appreciate his woods, which are the best means of holding the soil. This can best be done by the forester, whose training and experience make him peculiarly adaptable to soil conservation work.
- WOODLAND, A PART OF THE FARM PLAN. Soil Conserv. 2: 117-119, illus. December 1936. (4368)
"Census figures show that the woodland products of the farm constitute a considerable part of the total farm revenue." The author contends that the farmer's idea of woods being so much waste land "is a natural heritage from early days, the result of the struggle of the pioneer to hew a farm out of the wilderness." This point of view, however, changes and "more and more . . . is it becoming recognized by the farmers that . . . so-called wasteland, including the woods, should be managed for whatever resource it will provide."
- RAMSEY, G. R. (4369)
WOODLANDS FOR IOWA FARMS. Iowa Agr. Col. Ext. Cir. 222, 12 pp., illus. 1936.
Farm woodlands are believed capable of returning a good income to owners if correctly managed. "Forest products were one of the ten leading farm crops in the United States in 1933 with a cash income of \$62,-782,000. In that year Iowa forest products ranked ninth in the Central States in cash income from forest products cut and sold from farms with \$869,000." The author cites factors favoring growth of woodlands such as tax adjustment, refuges for wildlife, and maintenance of steady stream flow.

- RODDA, T. E. (4370)
FARM FORESTRY. Jour. Agr. [New Zealand] 54: 193-203, illus. April 1937.

General notes on shelter plants are given, planting rules are summarized, plants are listed, and the various uses of timber on a farm are discussed.

- SHAW, T. E. (4371)
WOODLAND CONSERVATION NECESSITATES PROTECTION. Purdue Agr. 30: 106, 117. June 1936.

"Much of the erosion control work now being done by the Civilian Conservation Corps [in Indiana] is the direct result of pasturing land which should have remained in forest." The writer points out the benefits to be gained by the State in forest conservation and proposes forestry practices to this end.

- SHIVERY, G. B. (4372)
FARM WOODLAND IN TENNESSEE. Tenn. Agr. Col. Ext. Pub. 144, 20 pp. 1933.

The author points out the various advantages of farm woodlands. They are a source of revenue through the sale of timber, fuel, posts, and poles; they reclaim eroded or waste lands and protect steep exposed hillsides; they utilize wet lands and odd-shaped portions of land; they distribute and retard run-off; and they invite bird and animal life.

- (4373)
PRACTICAL EXAMPLE IN FARM WOODS MANAGEMENT. Tenn. Agr. Ext. Pub. 186, 12 pp., illus. 1934.

"Everything considered, such as growing site and soil, practical logging with special regard for safeguarding immature trees, very close utilization, improvement cutting, protection against fire and grazing, and a sympathetic stable ownership, it would appear that we have in the demonstration described in this publication an example in woods management especially worthy of consideration as well as a guide for all farm owners who desire to practice forestry."

- SHUHART, DON V. (4374)
THE FARM FORESTRY PROBLEM IN OKLAHOMA. Sooner State Conserv. News, pp. 4-5. July 1936.

"Farm forestry is an essential part of a well coordinated and carefully integrated program of soil and water conservation, based on sound principles of farm management . . . In solving this farm forestry problem in Oklahoma . . . the standard practice established by foresters in both this country and abroad is being followed, tempered with the experience of farmers in each community in which projects or work areas are located." The plan of attack is described.

- SIECKE, E. O., AND WYMAN, L. (4375)
TREE PLANTING BY FARMERS FOR FUEL, FENCE POSTS, AND SHELTER. Tex. State Forester Bull. 13, 23 pp., illus. 1920.

"A popular treatise on tree planting for the nonwooded farms of Texas. The authors point out the value of windbreaks in their beneficial influence on crops, in lessening erosion, and in mitigating the severity of sandstorms. Instructions are presented relative to the establishment and maintenance of windbreaks and groves with reference to location, selection and arrangement of species, and renewal."—Expt. Sta. Rec. 44: 838. 1921.

- SMITH, H. L. (4376)
IMPROVING THE FARM WOODLOT. Rural New Yorker 95: 283, illus. March 21, 1936.

This paper offers practical data on maintaining farm forests for profit. Forestry practices for small wooded areas are suggested.

- SPRING, S. N. (4377)
PUBLIC HAS INTEREST IN MANAGEMENT. Forestry News Digest, p. 5. November 1936.

The author suggests furthering the sustained yield idea in wood-lot management through a cooperative farmers' association.

- SPRING, S. W., AND GUISE, C. H. (4378)
FOREST PLANTING ON THE FARM. N. Y. Agr. Col. (Cornell) Ext. Bull. 226, 42 pp., illus. 1932.
"Forests are being planted not only for financial and economical consideration, but to secure protection from wind, to prevent the erosion of soils from hillsides, to make property more beautiful, and to aid in improving certain unfavorable social and economic conditions that are bound to appear when our supply of valuable timber is gone." Choice of species, planting methods, care of plantations, and economics are discussed.
- STEEN, E. B. (4379)
THE FARM WOODLOT AS A BIRD REFUGE. Outdoor Ind. 3 (2): 2, 25, illus. March 1936.
Discusses value of birds in farm wood lots, with suggestions for feeding and for cover to encourage those species which control injurious insects and spread the seeds of fleshy fruits, nuts, and coniferous trees.
- STEFFEN, E. H., AND GENAUX, CHAS. M. (4380)
TREES FOR WASHINGTON FARMS—WHY, WHERE, WHAT, WHEN, AND HOW TO PLANT. Wash. Agr. Expt. Sta. Pop. Bull. 143, 47 pp., illus. 1928.
This bulletin presents practical data on forestry conditions in Washington and gives planting information on various species of trees. A partial list of trees is as follows: Cedar, larch, pine, spruce, ash, locust, poplar, elm, and oak. Local conditions are given consideration.
- TILLOTSON, C. R. (4381)
CARE AND IMPROVEMENT OF THE FARM WOODS. U. S. Dept. Agr. Farmers' Bull. 1177, 24 pp., illus. 1916, (Revised, 1920.)
"It has been found in the prairie region that through the protection afforded by the most efficient grove windbreaks, the yield in farm crops is increased to the extent of the crop that could be grown on a strip three times as wide as the height of the trees . . ."
- GROWING AND PLANTING HARDWOOD SEEDLINGS ON THE FARM. U. S. Dept. Agr. Farmers' Bull. 1123, 29 pp., illus. 1921. (4382)
"It is the purpose of this publication to point out simple methods which may be followed in planting and caring for hardwood trees on the farm and in collecting, extracting, and storing the seed of the common hardwood trees of the United States and in growing the young trees in a home garden or nursery." Pages 6 and 7 deal with the location and planting of windbreaks to assist in checking wind erosion.
- TRENK, F. B. (4383)
FARM WINDBREAK: ITS PLANNING AND PLANTING. Wis. Agr. Col. Ext. Cir. 267, 16 pp., illus. 1934, (Revised 1936).
Five points on successfully growing a windbreak are given: (1) Choose the best location; (2) prepare the soil properly; (3) choose the right trees; (4) space the trees most effectively; and (5) give young trees the most helpful conditions for growth.
- TURNER, GEORGE W. C. (4384)
GROWING TIMBER ON THE VERMONT FARM. Vt. Agr. Ext. Cir. 90, 31 pp., illus. 1936.
The Vermont timber situation is stated, with a discussion on improvement and protection of young timber stands, and the effect of grazing on soil and woodland vegetation. "A general knowledge of how trees and forests grow and of their environment is essential in the care of the forest. Every tree and group of trees presents a slightly different problem and calls for a separate judgment by the worker."
- WALDRON, C. B. (4385)
TREES, SHRUBS, AND PLANTS FOR NORTH DAKOTA FARMSTEADS. N. Dak. Agr. Col. Ext. Cir. 67, 28 pp., illus. 1933.
This circular gives information on what species of trees are suitable and how to plant them. A list of trees is included of windbreak, timber, and ornamental value.

- WALLACE, H. A. (4386)
 FARM WOODLANDS AND FARM INCOMES. South. Lumberman 153: 112. December 1936.

Draws attention to the necessity of forest conservation as an important factor in the solution of the soil-erosion problem.

- WATKINS, C. W. (4387)
 TREES AS A FACTOR IN WEATHER CONTROL. Nebr. State Bd. Agr. Rept. 1935: 184-190, illus. 1935.

"The program now being organized by the U. S. Forest Service for establishing strip shelterbelts through the agricultural sections of six plains states should be of interest to residents of Nebraska. This tree planting program, although larger than any previous undertaking is only a planned expansion of what has been going on in this state since the beginning of its development." An outline of the program is given.

- WESTVELD, R. H., and VAN CAMP, J. L. (4388)
 FOREST PLANTING ON MICHIGAN FARMS. Mich. Agr. Col. Ext. Bull. 147, 44 pp., illus. 1935.

Forest plantations are suggested for sandy or stony soils, and for steep slopes. Recommended species include northern white pine, red, jack, Scotch, and western yellow pines; white, Norway, and black spruces; black locust and black walnut. Instructions for planting are given.

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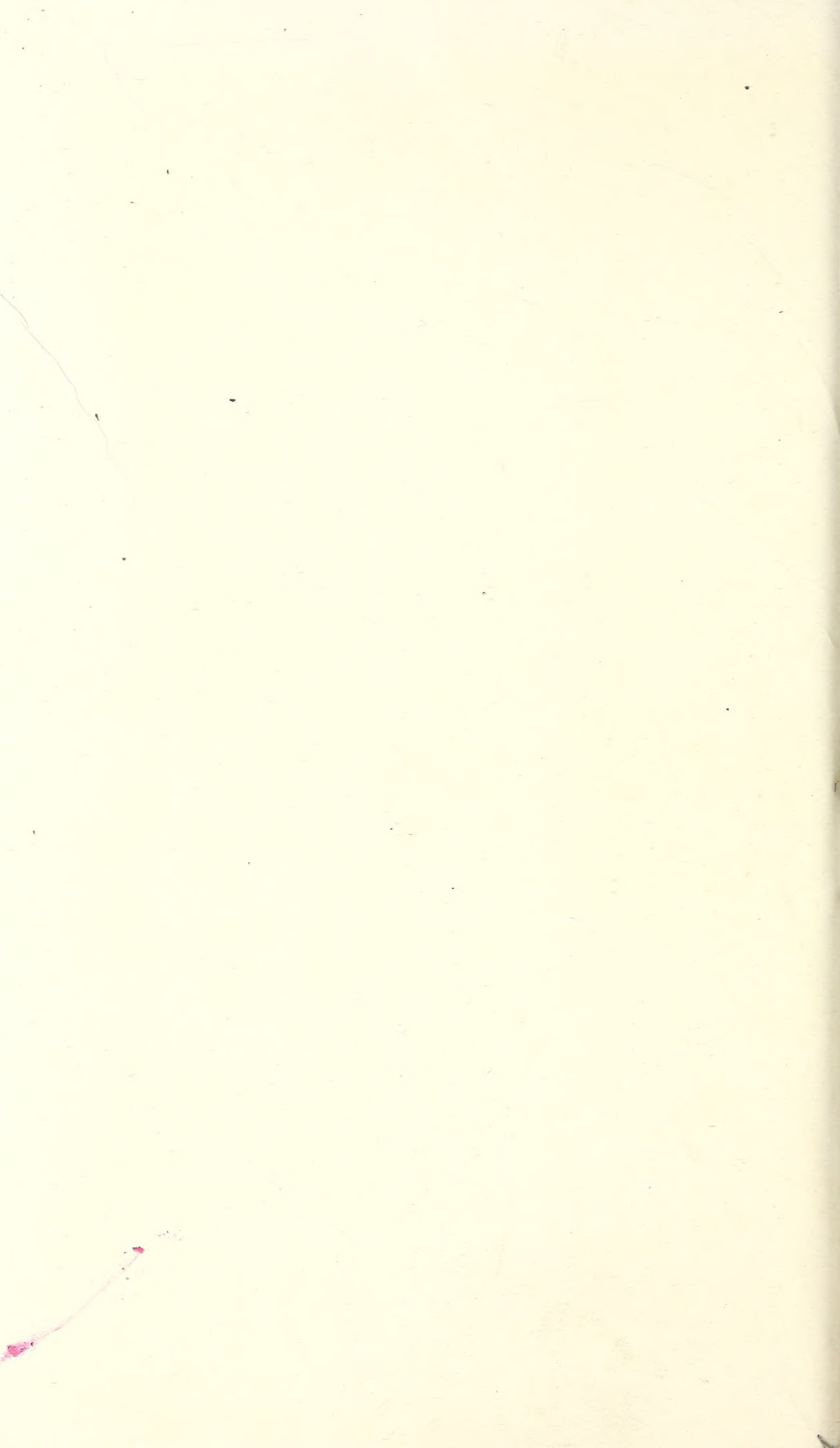
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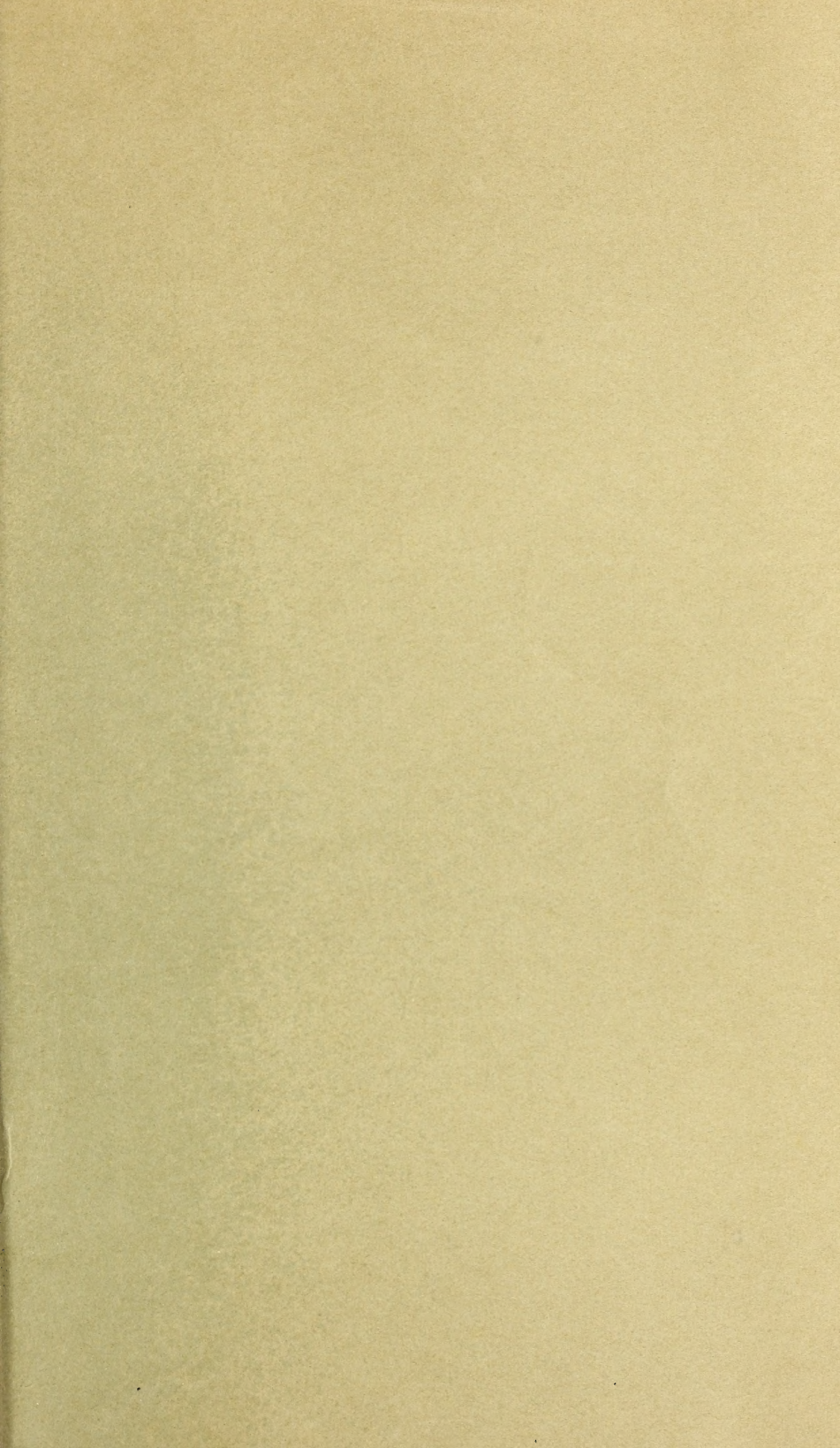
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